Chemistry at Victoria
The Wellington University

A Personalized Account of the Hundred Years from 1899

by

Brian Halton

Emeritus Professor of Chemistry

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A university, simply stated, is an association of teachers and students, with this characteristic, that the teachers do not cease to be students.

J.C. Beaglehole
***The University of New Zealand: An Historical Study*,**
New Zealand Council for Educational Research, Wellington: 1937, p. 13.

They work to pass, not to know; and outraged Science takes her revenge.
They do pass and they don't know.

Thomas Huxley
***Science and Education: Collected Essays Vol 3*,**
Macmillan, London, 1893-94.

Be a physical chemist, an organic chemist, an analytical chemist, if you will –
but above all be a Chemist.

Ira Remsen
Foundation Professor of Chemistry,
The Johns Hopkins University,
F. H. Getman, *The Life of Ira Remsen*, 1940, 71.

Photograph from the School of Chemical & Physical Sciences, Victoria University of Wellington

Preface

Many histories of academic institutions have appeared over the years, none better known in Wellington than Rachel Barrowman's *Victoria University of Wellington 1899-1999 – A History*, and in New Zealand *The University of New Zealand: an historical study* by J. C. Beaglehole. Several of the now independent universities provide a synopsis of their existences and various departments and schools do likewise in accounting for their place in the way of things. However, when it comes to seeing the evolution of a single area of study in any one of the now eight independent institutions, Auckland University of Technology, Lincoln University, Massey University, University of Auckland, University of Canterbury, University of Otago, University of Waikato, and Victoria University of Wellington, there are remarkably few accounts available. The Cambie and Davis book: *A Century of Chemistry at the University of Auckland* is an exception. What follows serves to rectify this for Chemistry at Victoria University of Wellington.

The Department of Chemistry at Victoria was my home away from home until its amalgamation with the Department of Physics in 1997. The subsequent emergent School of Chemical and Physical Sciences has seen me through the last years of my formal career and into my ninth year of retirement as an emeritus professor. The need for a record of the development and evolution of the discipline of chemistry at this institution has become more pressing with the passage of time. My attempt to record the history of the Chemistry Department, and the subject as it has evolved at Victoria fills the following pages. But I am no historian and am unprepared to sit for days on end in dusty archives trawling through voluminous files. So my history is merely a personal perspective constructed from reminiscences, from information passed to me by many individuals, and from the records of the institution and its teaching through the calendars of Victoria College, Victoria University College and Victoria University of Wellington, and some of its corporate archive.

The inclusion of many names in the text and the appendices has come from the generous assistance of people who remember. Nevertheless, it is the personal recollections of Professor Neil Curtis and his searches of 'papers past' that have provided significant amounts of material. Then the collective wisdom of Drs. Jim Pearce and David Weatherburn has served to amplify and correct much other information that has been gathered. These and others have provided snippets of information, names of support staff, and dates. Thus, I express my gratitude to (alphabetically): Colin Bleasdale; Jannie Brown; Ian & Susan Burgess; Patricia (neé Barr) & Brian Burridge; Joan (Mattingley) Cameron; Alan Clark; Don Cook; Sue Creese; Neil & Yvonne Curtis; Barbara Dasent; Sally Davenport; Brian Davis; John Featherstone; Michael France; Richard Furneaux; Teresa Gen; Dave Gilmore; Margaret Gordon; Jenny Hall; Margaret Halton; Helen Harvey; Rich-

ard Haverkamp; Don House; Romini Jayasinha; Jim Johnston; Bill Jordan; Jackie King; Robert Keyzers; Douglas MacFarlane; Ken MacKenzie; Anwyn Martin (neé Long); Kerie McCombe; Arch Matheson; Peter Northcote; Jim Pearce; Harry Percival; Alan Rennie; Dick Singleton; David Stead; Ian Torrie; Darcy Walker (via his daughter Jenny Lendrum); Tricia Walbridge; David Weatherburn; Jenny Wollerman; and Tony Woolhouse.

The staff of *The Beaglehole Room* in the Victoria University Library, especially Sue Hirst and former archivist Danny Naylor, have been exceptionally generous with their time by seeking and having archival materials ready for me to peruse at my leisure. Claire Angliss, of the Development Office, kindly provided an electronic copy of the UNZ Roll of Graduates, Steph Livick of Campus Care, many architectural site plans of campus buildings, and Vanessa King, the Records and Archives Administrator, additional access to records. Dan Thompson and Liza Wilson of SCPS have been of great assistance in gathering other archival records for this work. I am especially grateful to my wife, Margaret, Joanne Harvey and Neil Curtis for proof-reading the entire manuscript. Rebecca Hurrell, the Managing Editor of *Chemistry in New Zealand* has transposed the text and its illustrations into the book form that the Canterbury Educational Printing Services have so professionally produced for me yet again.

Finally, I am more than grateful to Prof. John Spencer (Head) and my colleagues in the School of Chemical and Physical Sciences at Victoria University of Wellington. They have shown me their friendship, patience, tolerance and good humour over many years, and made retirement a more than worthwhile occupation.

BH
Wellington, October, 2012

Contents

Chapter One

The Foundation Professors

The first university to be established in New Zealand was the University of Otago, created by an ordinance of the Otago Provincial Council in 1869. It opened and enrolled its first students in 1871, having appointed three professors to provide the curricula. These Professors, New Zealand's first, were George Samuel Sale (1831–1922; Classics and English Language and Literature; top left), John Shand (1834–1914; Mathematics and Natural Philosophy; top right), and an outspoken 27-year-old Scot, Duncan McGregor (1843–1906; Mental and Moral Philosophy and Political Economy; lower left) who resigned in 1876. The following year a Professor of Natural Science (James Gow Black, 1835–1914; lower right) joined the staff and was the first Professor of Chemistry in New Zealand. He was unanimously chosen from a list of twenty-three applicants and arrived with his family at Port Chalmers on the *Christian McAusland* at the end of 1871. Otago's provincial superintendent, James Macandrew, had

Reprinted from *The University of Otago - A Centennial History*, by W.P. Morrell. With permission *from The Hocken Library* Otago University.

wanted provision made for a school of mines and of agricultural chemistry at the University and the chair of natural science was partly subsidised by the provincial government. It was specified that the incumbent be able to teach chemistry and mineralogy and their applications to agriculture and mining. By 1877, Black was professor of chemistry and mineralogy and soon afterwards, with the establishment of the School of Mines, professor of chemistry, a position he held until his retirement in 1911.

Although Otago University was formed prior to the 1870 parliamentary statute that established the University of New Zealand (UNZ), it took until 1874 before it was absorbed into the fledgling federal institution. By that time Otago University had conferred but one degree, and the Canterbury and Auckland Colleges had been founded as constituent colleges of the national university. The UNZ then became the sole degree-granting body for all the New Zealand university institutions until its dissolution in 1961. It was the post-WWII expansion and changing attitudes that led to the disestablishment of the UNZ, and it followed the Parry report which had severely criticized it. Thus it was that the power to confer degrees was transferred to the separate colleges that were each chartered as a university, which Otago had always been, by separate government statutes in November 1961.

Victoria College was not formed until 1897, the fourth and last of the major institutions. It came from the efforts of Chief Justice (Sir) Robert Stout. His enthusiasm and dedication to education led to the formal creation of the College through legislation introduced by Richard Seddon to mark the 60th jubilee year of Queen Victoria. An act of parliament was passed on December 22, 1897 establishing Victoria College. It rapidly became known as a '*poor man's college*', a people's university, with men (and women) working during the day and gaining a university education in the evenings. By 1898 a sixteen-member Council had been instituted and in June of that year it decided upon four founding professors, three Scotsmen and a Yorkshire man from Doncaster, to teach English Language and Literature, Classics, Mathematics, and Chemistry and Physics. The Professors were employed at an annual salary of £700, while College Assistants were paid a mere £100, but that was for 5-8 pm evening work. These sums can be compared to that of William Mowbray, then Headmaster of the Thorndon School at the time, who earned £370 per annum. The professors were John Rankine Brown (Classics), Thomas Easterfield (Chemistry and Physics), Hugh MacKenzie (English Language and Literature) and Richard Maclaurin (Mathematics).

The unmarried Maclaurin elected to travel to Wellington from England via the US and Auckland rather than come with the other three, Easterfield, MacKenzie and Brown, who travelled together with their wives and children on the steamship *Kaikoura*. They entered the harbour on April 1, 1899, one of Wellington's glorious autumnal days. '*If, on that 1st of April when the Council met them, they had felt a*

little foolish they might be forgiven. Somehow, before they left England, they had been given to understand that their college was not only adequately endowed, but actually physically in existence - that their task as founders was, as it were, to walk in and begin lecturing'.[1] The reality was very different. There was no college edifice and little finance. The professors were allowed to accustom themselves to their new surroundings prior to being given a formal welcome in the offices of the Education Board on Wednesday April 12.

Of the four foundation professors, the twenty-eight year old Maclaurin was regarded as the most gifted. He was born in Scotland, but raised in the Waikato and Auckland, and educated at Auckland (BSc, 1890) and Cambridge in mathematics (BA, 1895; LLD, 1904). He also gained a philosophy degree from Strasbourg. His time at Victoria was a mere seven years as he was lured to Columbia University in New York as professor of mathematical physics and, within a year, to MIT, which it is said he virtually created. A later President of MIT is said to have thanked Victoria for *yielding him to us in America*.

In comparison, Thomas Easterfield was thirty-three years of age, older than Maclaurin, and married with a German wife and two daughters. After arriving, Easterfield was told by one of the College Councillors that he had gained his post by just one vote simply because there was no Scotsman available! He is described by Beaglehole[1] as having the normal persistence of a Yorkshire man but a lightness, a swiftness of mind and body (a good middle distance runner in his undergraduate days), an habitual cheerfulness and buoyancy that were all his own. The inaugural lectures[2] were given a week after their formal welcome, with Easterfield entitling his *Research as a Prime Factor in Scientific Education.* Of the four founding professors, he was the one with a definite purpose. Coming to Wellington from Cambridge, Zurich and Würzburg, it was the German training that formulated Easterfield's approach to science. He argued for early specialization by students with research work and original investigation to commence before a degree was taken (awarded). He went on to explain the *absolute necessity* of a *really good laboratory*. His subsequent work was dominantly on NZ native plants, to which he referred in his inaugural lecture. In his second year, he not only published his own research results but also read the paper of one of his first students, P.W. Robertson, to the New Zealand Institute (Wellington), the forerunner of the Royal Society of New Zealand.

The professors were required to teach beyond their subject. Easterfield gave classes also in physics and mechanics and MacKenzie extended from his English language and literature to mental science. All four had arrived to teach in a non-existent institution as there was no *Victoria College*. The Council had rented rooms for the arts subjects at the Wellington Girls' High School in Pipitea Street, Thorndon, and then it gained three upstairs rooms in the Technical School building

in Victoria Street for science. However, these latter negotiations were incomplete when the professors arrived.[3] Easterfield's Cambridge colleagues had presented him with a high class chemical balance but the other equipment that he had requested be purchased upon his appointment was damaged in transit from London. There was nothing in the way of a science laboratory in the upper rooms of the Technical School. They had neither water nor gas, let alone drains. During 1899, Easterfield prevailed upon the powers of the time and secured a £3000 laboratory grant that enabled the establishment of Victoria's first chemical laboratory, albeit temporarily.


THE PROFESSORIAL BOARD 1899
Mackenzie Easterfield
Maclaurin Brown

From ref.1, with the permission of VUW

The first Victoria College students were enrolled on Saturday April 8 in 1899 and the professors met them two days later, the following Monday. The first two inaugural lectures were delivered that same Monday evening and classes began the following day. Within a few months Easterfield had thirty chemistry students, fifteen in mechanics and eleven in physics. Course curricula and degree regulations were laid down by the University of New Zealand but it was the professors who decided that the College should operate two terms per year. Most lectures were delivered in the evenings, except on Saturdays, so that clerks and civil servants could attend. The early College calendars list the courses to be given with their schedule and by whom, but the tutorials had elements of flexibility and one of Easterfield's had the possibility of a Saturday. There were requests from Council to give correspondence courses but they were refused as the four staff felt overburdened. However, they did give public lectures in 1901, Easterfield offering '*The romance of coal tar*'. He instructed a class of lawyers in general chemistry at their request, which gave him great satisfaction as many of the attendees subsequently moved to distinguished positions in the country. Easterfield's persistence with experimental teaching gath-

ered its rewards as Government bestowed its first Victoria-only scholarship, the *Sir George Grey in science* in 1900, and chemistry student, Marion K. Wilson became the College's first senior scholar in 1901. The second senior scholarship also went to a chemist, this time P.W. Robertson (1903) who became Victoria's first Rhodes Scholar in 1905 and about whom more will follow. The first science graduates were James Bee and Mary Blair who graduated from the University of New Zealand in 1902 having studied at Victoria.[4]

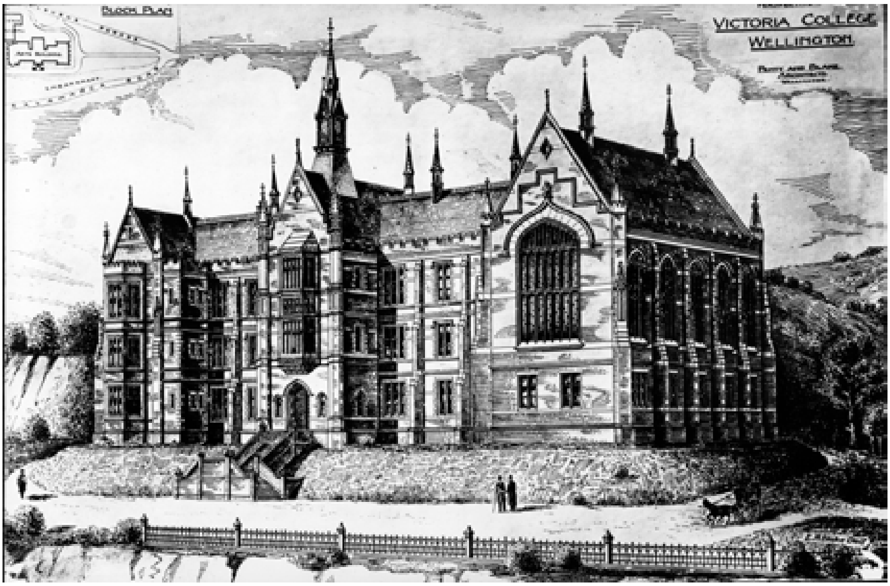
Of course, as a new institution, the College needed a motto and *Sapentia magis auro desideranda* (knowledge is superior to gold) was chosen by the professors in 1902. This was not without debate. Thus, was wisdom to be desired more than gold or was a lack of wisdom preferable to a lack of gold? Easterfield is said to have commented (in jest): *Was wisdom to be desired for the sake of more gold?* In 1904, government gave all the university colleges a *specialisation grant* of £1500 that was paid in 1905. Robert Stout had long wanted Victoria to hold *the* law school in NZ, but the institution did not gain a specialist school in any area until 1973, when Architecture was approved. However, Council succeeded in persuading government to advance an additional £500 so that it could specialise in both law (which was subsequently accepted as a special school – but not a *specialist* school such as medicine) and science.

Despite Easterfield's enthusiasm and experimental flair, Victoria College was not allowed to offer degrees in science itself until either geology or biology was taught. Classes and courses in geology were proposed, but it was a chair in biology rather than geology that was created in 1903. New Zealander Harry Borer Kirk was appointed despite an education gained entirely in this country and a lack of academic experience. He was, however, a born teacher - but he refused to teach geology. The teaching was in a rented room (at 5 shillings per week) in Miss Baber's Kindergarten in Pipitea Street. Staff and courses were added slowly in line with monetary expediency. The College sought appointments in conjunction with government agencies in the hope that half of the salaries would be met, a feature that became common again in the latter part of the twentieth century. However, by 1908 Council had persuaded the Premier and the Minister of Education that funding was urgently needed to maintain the general teaching at the College; three new appointments were made in 1909. Of these, that of Thomas Laby to a chair in physics is most notable for the modern School of Chemical and Physical Sciences. An Australian with pioneering research (without university matriculation) into radioactivity at Sydney and the Cavendish Laboratory in Cambridge, Laby was appointed at the reduced salary of £600. He is recorded as being an indifferent lecturer but a proficient trainer of researchers. He became internationally known for his set of tables with Kaye, *Tables of Physical and Chemical Constants*, which was first published in 1911, and written because he was given no facilities to carry

out his researches until late in 1910. The other science appointment that year was of Charles Cotton to lecture in Geology and assist in English Language and Literature, Classics, Modern Languages and Physics! He became the first Professor of Geology in 1921.

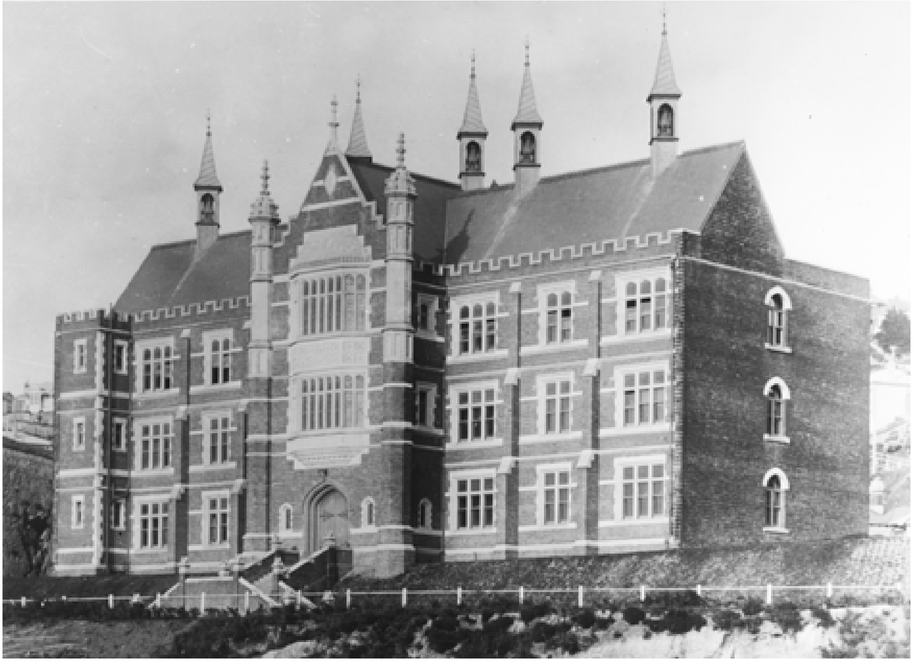
On its 10th anniversary, Victoria College had a staff of sixteen, comprising ten professors, three lecturers and three demonstrators (or assistants) in science, and a student roll of 559, four times the number that had enrolled upon opening.[4]

By then, it had its own home. Charles Pharazyn, a Wairarapa sheep farmer with a penchant for Wellington, had offered £1000 if the College Council built its college on the Kelburn Park Reserve, *a six acre site that comprised the 'park' and a precipitous hillside overlooking the city.*[1] A Council committee reported that the land was unused, and although unsightly, was convenient and accessible, and the best available under the circumstances. It became Victoria College land in 1901, with the monies made available the following year. A design for the college building was accepted and let in 1903. Initially, the design was for a two storey structure, but Richard Seddon insisted that a third floor be added. However, tenders were called only for the science wing and the middle part of the arts block and it was this that was opened on March 30, 1906. To mark the opening Easterfield provided experimental demonstrations in his new laboratory and was accused (by



Our future home - 1903 block plan (VUW 2-184*)

*Images from the VUW Beaglehole Room Collection are designated throughout as (VUW number).



… and the 1906 reality (VUW 2-186)

some) of creating a science block of extravagant size; he kept quiet about his plans for another building.

In order for the College to be properly attended, a cottage for a permanent caretaker was built and located towards the top of the College land overlooking the harbour at a cost of £404 (the professorial salary was 1.75 times higher – a conservative equivalent in 2012 would appear to be about $750,000). The first caretaker and janitor was Mr. James Brook (Brookie), appointed from 105 applicants and incumbent until his death in 1926 when his son (W.S. – young Brookie) took over until 1943. From 1914, W.S. was the indispensible College carpenter.[1]

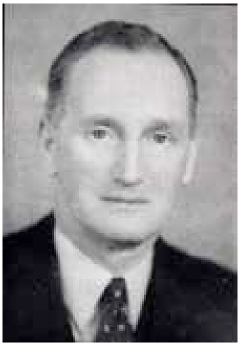
There was much for the early academics to do, not least in gaining some part of the University decision making process from the Council. Reform movements spread through the colony but there was little by way of change until 1914 when a University of New Zealand Board of Studies was established. It consisted of five members of each College professorial board to advise the UNZ University Senate of matters academic. That same year the Victoria College amendment act was passed and the name was changed to Victoria University College (VUC). The constitution was then amended to allow two members of the Professorial Board to be on the VUC Council. By 1915 some 83% of its registered students were part-time,

something that VUC became recognized for and kept. The proportion declined, especially after the bursary scheme that resulted from the Hughes Parry report of 1959, and was close to 33% in the late 1960s.

The onset of the Great War had its effects on the College. Easterfield turned to providing morphia for military hospitals and carbon for searchlights from his chemistry laboratory, while in the physics workshop attention was given to signalling devices and bomb-throwing equipment. The war years gave VUC its greatest controversy with the dismissal of its 1901 appointed professor of Modern Languages, George von Zedlitz.

Von Zedlitz was born on March 10, 1871, of an English mother and a German father, a Silesian Baron (Silesia is a historical region of Central Europe located mostly in what is now Poland, with smaller parts in the Czech Republic, and Germany). He was raised by his mother and had not seen his father since 1875 when he was four years old. Nonetheless, as a person of Silesian parentage, the Dominion government moved to have him removed by passage of the Alien Enemy Teachers Act of 1915. This law demanded the College Council remove him from its payroll. Council had previously refused to let him resign in the hope of stopping the Bill, but on its passage into law Council had no choice but to dismiss him. However, it never reinstated him when able to do so after the war. What is of particular interest here is that Easterfield's wife was also German but, because she was not involved in educating Dominion citizens, she was left alone, apparently not causing any public concern at all.

James Brook, from ref.1 with permission, VUW



W.S. Brook, from ref.1 with permission, VUW

Chapter Two

Chemistry, Slop Buckets and Spirit Lamps

At his inaugural lecture in 1899, Thomas Easterfield enunciated a philosophy that he was to develop over the years. Namely, that after a relatively brief initial training a student of science should begin an original investigation and be introduced to the primary scientific literature. Thus, his ideal was for a significant component of the undergraduate curriculum to involve original laboratory work in chemistry. He stated:[2] '*As far as the chemist is concerned it must be allowed that the specialization system has turned out a far more enthusiastic and powerful body of teachers than the system of general education*'. He lamented the teaching of science in schools commenting that '*those schools which include the sciences as part of their curriculum do not as a rule teach the subjects with an educational ideal before them but rather to please the parents or to prepare for an examination*. He went on to discuss '*the bad effects of careless training on the schoolboy before coming to the university'* concluding that '*if a boy is inaccurate in his measurements and in his statements during the first year of his experimental work he seldom recovers completely from the bad habits engendered thereby*'.[2] He also emphasised that pure research often had important unexpected commercial benefits, a fact stressed even today.

Upon arrival, and with no College facilities in existence, discussions centred around use of the present Prime Minister's residence on Tinakori Road, at that time a boarding house. After visiting, Easterfield made it clear that in order to teach

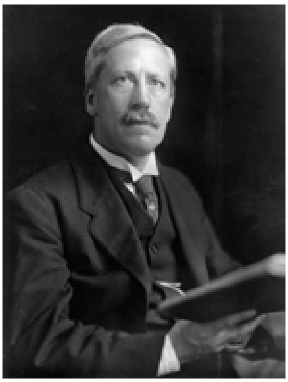
science he would need the entire ground floor as the upstairs bedrooms were quite unsuitable.[3] The matter was pursued no further and arrangements for the beginning Victoria College arts students to receive their tuition at the Wellington Girls High School were made. Discussions with the Technical School in Victoria Street for rooms to teach science were incomplete until just before the 1899 term began on April 18; only three upstairs rooms with no laboratory facility were secured. There was no water, no gas and no heating. Yet, despite these primitive surroundings, Easterfield adapted what he had as best he was able. This was much facilitated by a gift of glassware valued at £25 from Mr. G.W. Wilton, the founder of the company of laboratory supplies that carried his name into the 1970s, as the equipment purchased in London had been damaged in transit.[1] Laboratory tables were constructed from boards and placed on trestles. Water was brought in from the kitchen in large jugs and one or two buckets were left for the liquid waste; heating was from the use of spirit lamps. The balance that Easterfield had been given by his Cambridge colleagues was on a packing case in one corner. Thus, it was here that science was taught and where Thomas Easterfield began his New Zealand researches carrying out his own study and directing his students' experiments. There was no assistant and no lab attendant (a technician in the modern idiom), and the students had to bring up the water and empty the slop buckets (on one occasion this was missed and the corrosive liquid ate through the bucket, permeated the ceiling, and made a significant mess in the Technical School Director's office directly below).[3] The adjacent room was the physics laboratory and lecture room, and the students were required to remove their chairs and collapsible tables when they left – much to the annoyance of those in the room below.[3] Yet, such primitive surroundings did not deter the research efforts. Early students gained notable College honours and the enthusiasm of the foundation professor was undeterred in establishing his discipline.

Sybil Johnson: *Victoria College: First Chemistry Laboratory, 1901*. 1901 watercolour on paper. VUW Art Collection, gift of Lady Easterfield, reproduced with permission.

Although Easterfield had adapted the upstairs rooms of the Technical School for

laboratory use soon after his arrival, they were inadequate for a fledgling institution. Following approaches to the Council, representations were made to government for funds for laboratory establishment and the sum of £3000 was granted for the equipment of science laboratories. By the time the students returned for the academic year in April 1900, there was a dramatic transformation of the upstairs room. Indeed, the inaugural College calendar for 1900 describes these facilities by stating: *Well equipped laboratories have been fitted up in the Technical School in Victoria Street and facilities are provided for all the usual operations of experimental chemistry*. The nature of this laboratory has been placed amongst Victoria's archives with Sibyl Johnson's 1901 watercolour painting. This now hangs in the SPCS Laby 101 Office and is reproduced opposite. She, like many young women, was taught painting at the Technical School by a Mr. Nairn, who (with Easterfield's approval) allowed her (and others) to paint the laboratory. In Easterfield's view most were unsuccessful, but her painting became one of his most treasured possessions. The careful way in which the laboratory fund was used by the professor of chemistry over the next years even provided a small sum for the permanent laboratories in 1905. However, this did not mean that the state of affairs in the Technical School was to set a precedent in planning for the new (Kelburn) building, nor did it hold Easterfield back in providing the design for the new and permanent laboratory, after all he was *Director of Laboratories* and *Chairman of the Professorial Board*. The facilities that Easterfield had for physics were no better, about which he commented[3] '*... after all, the equipment was probably as good as that with which Isaac Newton had made some of his fundamental discoveries*'.

There was a single course in chemistry for many years and it comprised three lectures per week given from 5-6 pm on Tuesdays and Thursdays, and from 9-10 am on Saturdays to be followed by a three hour practical class until 1 pm. The lecture course fees were set as £1-11-6 (one and a half guineas) and the laboratory programme double that. The details of the programme and its evolution over time are recorded in Chapter 8.[3]



T.H. Easterfield (VUW 2-163)

The earliest research work that Easterfield embarked upon in Wellington was the chemical constituents of the poisonous tutu shrub (*Coriaria* species) that was ingested by livestock. This was carried out in collaboration with B.C. Aston, a chemist with the Department of Agriculture. They isolated and purified the poisonous component, tutin, and reported it in a joint paper in the 1900 *Proceedings of the New Zealand Institute*. This was followed by an account in the July 1900 issue of *Journal of the Chemical Society* – a remarkable achievement given the time over which the investiga-

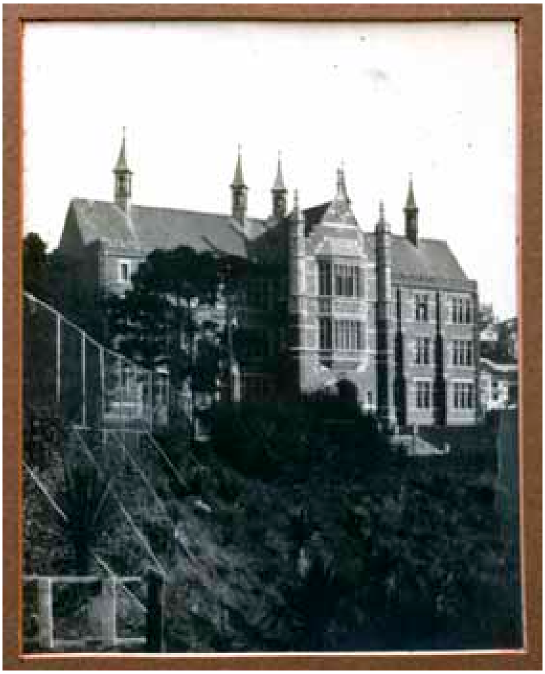
tion was performed and the need for surface mailing of the manuscript to England. Not only did he continue his collaboration with Aston studying karaka (*Corynocarpus laevigatus*) and rimu resins, he also worked on other topics in the chemistry of plant extracts, and in physical chemistry. In the 1918-19 period, he carried out experiments at the Miranui flax mill near Levin to determine if industrial alcohol (ethanol) could be produced by fermenting the juices of the flax leaf.[5] This was the largest and most well equipped flax mill of the era and his test runs produced 198.4 gallons of 95 per cent alcohol daily. This was not used but allowed to flow down the Miranui drains! The output equates to 50,000 gallons per annum that would have been worth £3750 a year at 1s 6d a gallon. Alfred Seifert, the mill owner, then went to the US that year of 1919 to purchase the necessary equipment for the industrial fermentation, but returned home with a methylated spirit plant instead. This work of Easterfield provides the foundation for biological chemistry in New Zealand and he is properly accorded the status as the father of this field of study.

During his time at Victoria, he published many papers reporting original research in the journals of the Chemical Society and the New Zealand Institute. SciFinder® has provided a dozen from the Royal Society of Chemistry (RSC) archive, and there are an additional nine listed in the Royal Society of New Zealand (RSNZ) archive (see Appendix XI). In this respect Easterfield was the most productive of New Zealand's chemistry professors of the time. His philosophy of science education is demonstrated by the number of papers written by his own students on their work, which he read to the NZ Institute in Wellington. Many of these were subsequently published in the Chemical Society journal. The 1901 NZ publication of Philip W. Robertson, *The Latent Heats of Fusion of the Elements and Compounds* (*Proc. NZ Inst.* **1901**, *34*, 501), is especially notable as Robertson was the College's second Senior Scholar, Easterfield's most brilliant student and his eventual successor. Overall, Easterfield's New Zealand studies led to some fifty original papers in various journals dealing with alkaloids and resins in New Zealand plants and trees, and the higher fatty acids and their derivatives. He is recorded as being a high spirited practical joker. He saw Victoria College gain its first Rhodes Scholar, P.W. Robertson (1905), and chemistry's first 1851 Scholar, Theodore Rigg, (1912). The latter gained a BA from Cambridge for agricultural research and entered the Cawthron Institute on its inauguration, receiving an Honorary DSc from Victoria in 1957 (see Appendix VII).

When the Kelburn College Building was opened in 1906, the chemistry facilities comprised a preparation room, advanced and elementary laboratories and a lecture room on the first floor with a metallurgical room and an elementary laboratory on the ground floor. The laboratory benches from the Technical School were installed in the Kelburn building and, it seems, moved years later into what became known as the 'west wing'. In 1906 the higher reaches of Wellington had no

running water and so the chemistry labs were opened with minimal facilities. A 1000 gallon water tank was located on a knoll to the south of what became known in 1958 as the Hunter Building to provide enough water in the case of fire. It was some years before running water became available.

The labs were described in the calendar as: *The Victoria University College laboratories afford unusual facilities for the study of experimental chemistry. To each student a separate bench is allotted furnished with gas, water and reagents. A charge of ten shillings is made for reagents, but untoward breakages must be made good*. The description went on to state categorically that anyone intending to be a chemist should spend not less than 18 hours each week at the bench and maintain a good record. Easterfield himself comments on the design that '*As I was at that time Chairman of the Professorial Board, I received a request for my opinions on the College Buildings. ... I showed each enquirer a sketch plan embodying my ideas of the most suitable arrangement of the buildings. ... The adjudicator in Melbourne remarked on the similarity* (of the architect-submitted final designs)'.[3]

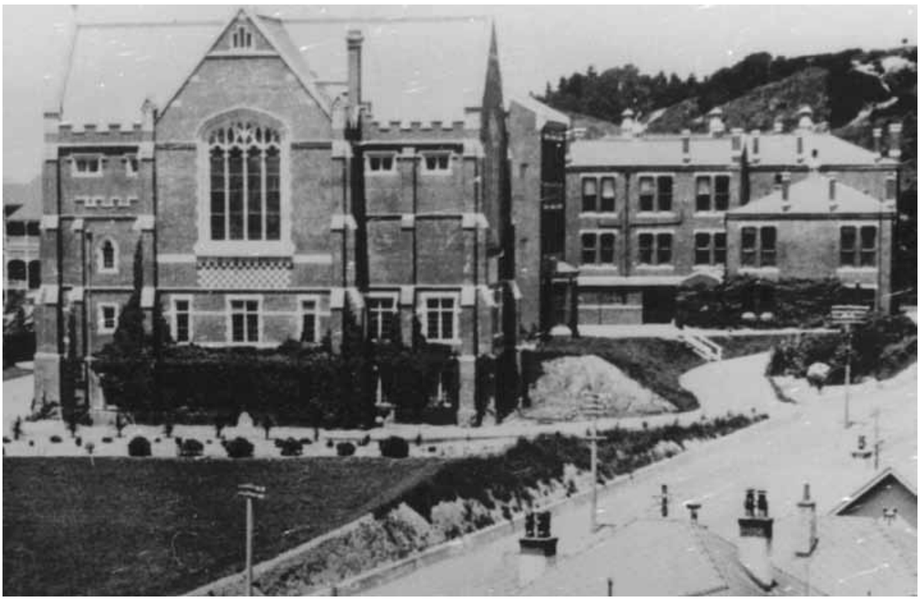


Hunter from the tennis courts (VUW 2-106)

The number of students had outstripped estimates even when the College building opened (there were 350 in 1906, 458 in 1909 and 547 by 1912) and the original building was never completed to its original design. Rather it grew in a haphazard manner, as did the College courses. The third storey was not fitted out when the building opened and the basement had no floor. The Football Club took to using the upper space for practice, much to the distress of Easterfield as pieces of plaster fell from the ceiling into his laboratory below. He wrote a number of letters to the College Council but it was only after four falls over a six month period that Council forwarded the letter to the architects, eventually to have repairs made. The plasterers contracted to make good the ceiling were those who had carried out the original installation and they billed the College for the work, much to the annoyance of the Finance

Committee. After some considerable attempts to have the repair costs covered by the original contractors, the plasterers were paid, as they had claimed that the fault lay, not with them, but with the sub-standard plaster that had been provided.

By 1909 and with some 458 students, the facilities were overcrowded. An extension was needed but funds were not easily available. Nonetheless, Government was prevailed upon and a 2-for-1 grant of £2000 was awarded. The Council debate concerning this vital matter had one of its members in opposition - his premise was that the College was not a university but a technical school since it ran its classes only in the evenings and not the daytime; he was severely berated by the Chairman! The College had real difficulties in raising the £1000 required of it and, among the Professors, Easterfield was not averse to trudging the town to solicit donations and he played no small part in raising the necessary funds. The outcome was construction of the 'west wing' behind the Arts block that opened for the first term of 1910. It was claimed as a science building,[1] but Barrowman[6] states that the wing provided two lecture theatres, a student's common room, a tearoom and a men's robing room, and the provisions had, according to the Council Minutes recorded in the daily newspaper, *The Evening Post*, two large lecture rooms on the first and second floors of the building. The space was allotted to communal facilities with no additional laboratories for science. However, by the 1930s some of the sciences, most notably Biology, were using space there. Subsequent reports to the



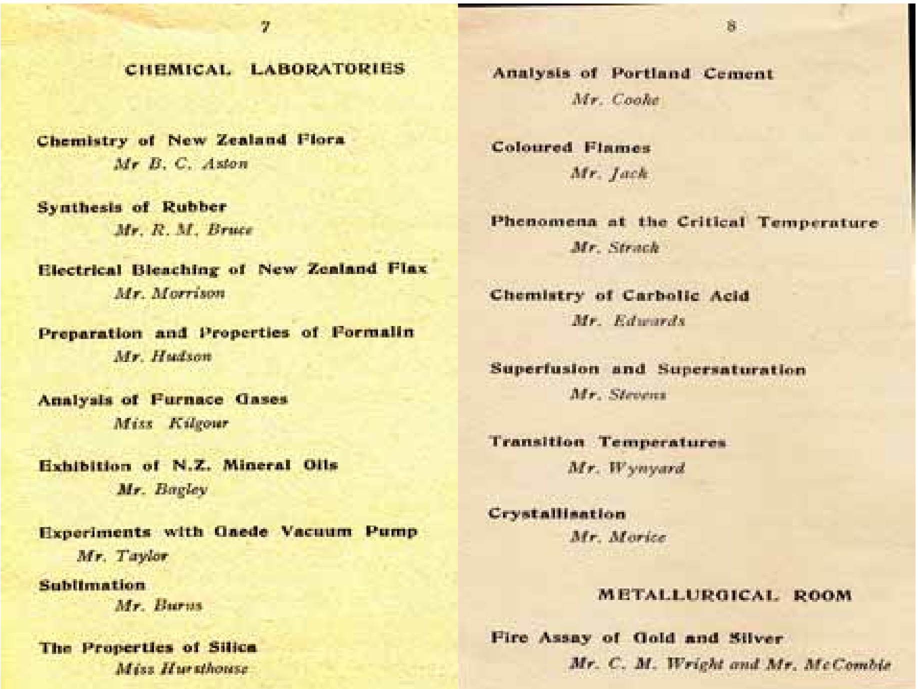
The Hunter Building showing the 1910 west wing, reproduced from ref. 15 with the permission of Victoria University Press

Education Department on building use imply that the west wing was occupied, in part, by science from its opening in 1910, though the details are not known. The originally planned North and South wings did not eventuate until the early 1920s and their constructions marked an end to building on the Kelburn campus until late in the 1930s. Thus, there was a push to complete the 3rd floor of the Hunter Building as the facilities for Physics were described by various College Councillors as deplorable and with equipment that was old and out-dated. Both the top floor and the basement were completed a little later in 1910 and Laby got his laboratory on the 3rd floor and a workshop in the basement. However, these were not to a scale or in a manner that he felt appropriate for physics research. The basement workshop provided the venue for the official opening of the Physics Laboratory. This was done by the Governor General on October 8 of 1910. Laby never got the support he thought necessary, and he resigned and went to the University of Melbourne in 1915. Geology was in an even worse state, never well regarded, and allocated just one room on the top storey of the original Hunter Building.

With Laby teaching physics from his arrival in 1909, Easterfield was able to concentrate solely on chemistry and inspire even more young research students. As a lecturer, Easterfield challenged his students, who were made to feel that a new aspect of civilisation was being explained to them. In 1913, he became the first chemist (and second recipient) of the New Zealand Institute's Hector Memorial Medal and Prize in recognition of his scientific work. He was successful in having James Bee, of Wellington College, appointed as what is thought to be his first *Assistant* in 1906. The position required attendance at the evening laboratories from 5-8 pm (or later) and it seems that Easterfield employed school teachers when available. However, elsewhere, some incumbents were worked too hard and by 1911 their time was regulated. Bee gained his MSc during the 1906 year, was then appointed Principal of the Presbyterian Ladies' College in Melbourne, and resigned. He was replaced in 1907 by Mr. R.E. Rudman, who had '*conducted a preliminary class in physics with ability*', as demonstrator in physics and chemistry. Rudman's successor in 1908 was F.R. Lankshear, who was designated as an *Assistant and Demonstrator* in the College calendar. It is interesting to note that the College Council minutes accord both Rudman and Lankshear the title of *Administrator and Assistant*. These terms then disappeared for chemistry in the calendar until 1912 when J.C. McDowall (who had begun duties in 1911 and stayed until 1915) was so accorded. Nevertheless, Council minutes record that Mr. F. Stukey was an assistant in 1911 and Mr. B.B. Low, a teacher at Newtown School, was a temporary replacement in 1912 (see Appendix II). The 1916 replacement for McDowall was R.M. Bruce (BSc, 1916) who retained the position as listed in the calendars until 1920. However, he was on active service for the last two and a half years of his tenure and appears among the war dead commemorated in the Victoria

Council Chamber. George Bagley became a temporary replacement for him.

On Friday September 13 in 1912, the Victoria College gave its first science *Conversazione* – the equivalent of an open day. The event was, however, an evening of lecturettes and demonstrations and admission was by ticket, only obtainable from the Registrar on Lambton Quay or the College. The four academics, Professors Easterfield and Laby (for chemistry and physics) and Kirk and Mr Cotton (for Biology and Geology), each gave short discourses (less than 30 minutes) in parallel sessions from 8.15-9.15 pm and then the laboratories were open for inspection with a range of 'experiments' provided for the public. Easterfield's presentation was entitled *Chemistry and Civilization - Value of Research*. An equivalent process took place under Robertson on Friday August 8, 1928, an event of only demonstration/experiments. One notable inclusion that evening was '*The detection of some New Zealand poisons*' by Brian Shorland (1909-1999), a student at that time. Brian became Director of the Department of Scientific and Industrial Research (DSIR) Fats Laboratory, and NZs recognized lipids expert. Following retirement in 1969, he began a second, honorary, career at


7

CHEMICAL LABORATORIES

Chemistry of New Zealand Flora
Mr B. C. Aston

Synthesis of Rubber
Mr. R. M. Bruce

Electrical Bleaching of New Zealand Flax
Mr. Morrison

Preparation and Properties of Formalin
Mr. Hudson

Analysis of Furnace Gases
Miss Kilgour

Exhibition of N.Z. Mineral Oils
Mr. Bagley

Experiments with Gaede Vacuum Pump
Mr. Taylor

Sublimation
Mr. Burns

The Properties of Silica
Miss Hursthouse

8

Analysis of Portland Cement
Mr. Cooke

Coloured Flames
Mr. Jack

Phenomena at the Critical Temperature
Mr. Strack

Chemistry of Carbolic Acid
Mr. Edwards

Superfusion and Supersaturation
Mr. Stevens

Transition Temperatures
Mr. Wynyard

Crystallisation
Mr. Morice

METALLURGICAL ROOM

Fire Assay of Gold and Silver
Mr. C. M. Wright and Mr. McCombie

Part of the *1912 Conversazione* programme, VUW-S19*

*Non-catalogued images from chemistry section of VUW Archive are designated S19 throughout.

Victoria University of Wellington (VUW), remaining active for the next 30 years as lecturer, researcher, author, editor, and commentator on nutritional and scientific matters, as an Honorary Research Fellow until his 1999 death. There was another conversazione at the time that the Easterfield Building opened in 1959 (p.37).

It was after the death of Thomas Cawthron in 1915 that the face of chemistry at Victoria began to change. Cawthron, a self-made man who used his considerable wealth to make many gifts to his adopted city of Nelson, left the sum of £240,000 for the establishment of a technical school, institute and museum in Nelson. Easterfield was appointed a member of the establishment advisory committee and, in 1919, it was he who was appointed as the inaugural Director of the Cawthron Institute. It has been said[1] that by the time Easterfield left Wellington he was beginning to have a sense of frustration and of feeling that he had given all that he was able to the fledgling Victoria University College. By then, his research interests had moved more towards agricultural science and his study oriented more in that direction so these could only have served to persuade him that Nelson was right. Indeed, when delivering the inaugural Cawthron Lecture[7] in the Nelson School of Music in July 1917, he espoused the benefits of Agricultural Chemistry. Coupled with his evolved interest, the new challenge of Nelson probably seemed even more attractive.

On his departure, Victoria appointed Thomas Easterfield professor emeritus, the first to be so recognised. As with his arrival into Wellington, his move to Nelson gave him a new institution, the Cawthron, the first privately endowed research institute in the southern hemisphere. His energies, vigour and scientific successes continued there, to the extent that the Cawthron Institute soon became recognised internationally as an institute of high repute. In an unpublished address given to the P.W. Robertson Society (an informal organization for Victoria's chemistry students and graduates established in 1970) on April 9, 1974, Elsa Kidson, a staff member at the Cawthron recounted: *I found him able to instil confidence and make me feel more capable, I am sure, than my abilities justified ..... but I can say that I never heard a word of criticism against him. He was always courteous and I never saw him get angry*.[8]

Easterfield did not confine himself simply to his professorial duties. His services as scientific adviser were in great demand by private firms and manufacturing companies, and he was deeply involved in the affairs of science. He was a Life Member of London's Royal Institute of Chemistry, a member of the NZ Institution and one of the inaugural Fellows on its transformation into the Royal Society of NZ. He held its Presidency in 1921-22, was a founding member of the New Zealand Institute of Chemistry (NZIC) and its second President (1933-34). He became actively involved with the Nelson Institute, and was even its President for several years.

It was the NZ Branch of the Royal Institute of Chemistry (RIC) that moved for the establishment of the (now) NZIC-RSC Easterfield Award. The medal was donated by the RIC (now the Royal Society of Chemistry) *in honour of the late Sir Thomas Hill Easterfield KBE, MA (Cantab), PhD (Wützburg), FRSNZ, FRIC, Hon.FNZIC. He was very well known for his contributions in the field of chemistry and will be remembered particularly for his inspiration and encouragement which was passed onto his students during the many years he was Professor of Chemistry at Victoria University College and for his infectious enthusiasm for chemical research.* The first medal went to Dr. John Rogers in 1954, who subsequently rose to the directorship of the NZ Fertiliser Research Association and was the 1981-88 Honorary General Secretary of the NZIC. Easterfield died in Nelson on 1 March 1949 and is commemorated in the history of Victoria University, having its first major science building named after him in 1958. Summaries of Easterfield's contributions have appeared.[9]

Rutherford and Easterfield in Nelson, 1925 (from VUW-S19) and
Easterfield in retirement (VUW 2-197)

Chapter Three

A Research Ethos for Chemistry

The appointment of a successor to Easterfield appears to have been straightforward. On December 17, 1919, the College Council announced that the brilliant Philip W. Robertson, the 1900 Wellington College dux with a Victoria MA in chemistry in 1905 and an MSc in 1906, had accepted the position. He had published eight papers in the NZ Institute Proceedings prior to graduating and continued an extremely distinguished career. As a student at Victoria he had been awarded a Sir George Grey Scholarship, a Senior Scholarship and the Jacob Joseph Scholarship. He became Victoria's first Rhodes Scholar in 1905 and proceeded to gain first-class honours in natural sciences at Trinity College, Oxford, and a PhD from Leipzig University. His prowess extended to both the tennis court and the hockey field. During his Oxford days, Robertson improved his general education. He travelled and read widely, gaining a deep interest in literature and writing that was to pervade the rest of his life.[10]

Of the eight papers he had published while a student at Victoria College, one was with Easterfield and the others alone, almost all from his work in the upstairs laboratory room in the Technical School. His PhD was gained under the direction of Professor A. R. Hantzsch, the heterocyclic chemist who has a pyridine and a pyrrole synthesis named after him, and with whom he had three papers published in the *Berichte*, one in 1909 and two in 1910. Following his doctoral study, Robertson moved to the East in 1909, teaching chemistry at Rangoon College in Burma.

In his autobiography[10] he describes this move as one dominantly made to be able to study Buddhism. In 1911, he moved back to England to a lectureship at the Imperial College of Science and Technology in London. He spent nine years there, gaining additional experience and a further twelve publications with his students, prior to his arrival in Wellington in 1920. His text with D.H. Burleigh, *Quantitative Analysis in Theory and Practice*, appeared the same year and it remained in use throughout his subsequent career. He was awarded the second chemistry Hector Memorial Medal in 1919 by the NZ Institute (there was a six year rotation for chemistry in those days) but, surprisingly, only elected to RSNZ fellowship in 1949 prior to his impending retirement in early 1950. Robertson spent 30 years as Victoria's Head of Chemistry and was appointed to *emeritus* status after his departure. The records say that he was tall and thin, immaculate in appearance, with a whimsical sense of humour and a modest and gracious manner.[11] His time in Burma had affected him to the extent that he felt a need for warmth both in his surroundings and in his clothing, and he rarely went out in the evening.

South wing, Hunter Building 1950s
(VUW 71)

Shortly after Robertson's arrival in Wellington the Hunter Building was enlarged with designs by architect Mr. C. A. Lawrence, of the firm of Swan, Lawrence, Swan and Hamilton. The originally envisaged library at the north (the North wing; Husbard Bros) and the science block at the south (the South wing; The Fletcher Construction Co.) were added from 1920 and construction of the north wing had already commenced before the government announced that it would also fund the south wing. Both were completed and occupied in 1923, and formally opened on Friday, October 18 that year by His Excellency the Governor-General, Viscount Jellicoe. The extra space in the science area was for Physics to expand into new laboratories designed by Laby's successor, Professor E. Marsden. Geology took the space in the basement and, with Physics moving from its accommodation on the ground floor in the original Hunter Building, Robertson and Chemistry expanded and occupied the first two floors. The Chemistry Department remained in this space for almost 20 years until the early 1940s when it took over the west wing. The dramatic increases in student numbers made this space too small also. Biology, which had been in desperate need of additional space in 1923, took over the third floor of the original Hunter Building and then the third floor of the west wing, which it vacated on moving to the Kirk building in 1940.

For more than twenty years of his headship Robertson was responsible for

teaching the whole of organic and physical chemistry. When he arrived in 1920, George Bagley, one of Easterfield's former students, was the Assistant and Demonstrator, the sole chemist to bridge the gap and provide continuity. Later that year, Robertson secured chemistry's first permanent appointee to this junior position in the person of one A.D. (Bobbie) Monro, who began his duties the following year. The ability to have a permanent assistant stemmed from a motion put to the College Council in April 1920 (Mr. Lomas, seconded by Mr. Forsyth) '*That … an assistant be appointed to each of the professors in chemistry, biology and physics, sufficiently well qualified to assist the professor in the teaching work of the university*'. The additional staff and the associated expenditure was deemed necessary because of the 'reconstruction' – the building of the new wings that was underway. The idea, as expressed by the mover was that professors should have time for research, and be relieved of the more elementary teaching work. The calendar shows Monro appointed and designated to 1922 courses with Robertson, and that inorganic chemistry was one of the courses for the Bachelor of Commerce degree. Monro held a BSc degree on appointment, gained his MSc in 1922 and performed research in inorganic chemistry. It appears that he was absent in 1927 as the post was occupied then by Dr. J. Sword, but Monro was back in 1928 and appointed as chemistry's first lecturer later that year, starting his formal duties in 1929 (Appendices I and II).

In 1924, the College celebrated its silver jubilee but there appears to have been little made of it in the Chemistry Department save for Easterfield's review.[3] Nonetheless, the occasion was recorded in the Wellington *Evening Post* newspaper on Wednesday April 16 saying, in part: *Through twenty-five years the College has been steadily instilling knowledge and forming character. The work has often been conducted under great disadvantages, in makeshift and crowded lecture-rooms and laboratories, with professors doing the work of tutors and compelled often to repeat their lectures because all students cannot be taken at once. Yet splendid work has been done. ..... There is reason here for public pride; but the pride should not be empty and vain. It should resolve into gratitude to the founders and to the professors who laid so well the foundations of the structure ..... so that the work so well begun may be carried forward to greater achievement.* Little has changed over the more than eighty years since.

The research that Robertson engaged in was analytical chemistry though now better described as physical organic chemistry. It was dominantly analytical in nature developing and describing methods for the quantitative determination of various elements in carbon compounds. In his student days, Robertson had shown an interest in the relationships between molecular structure and chemical properties in a range of compounds. This was developed through his time with Hantzsch and it led to a series of studies on the mechanism of reactions of organic compounds

P.W. Robertson lecturing in Hunter C3 (by the late Des Hurley, with permission)

that progressed well beyond his own era through his students. As we shall see, a number of those that he trained became remarkably successful, well-recognised chemists. From Robertson's time as VUC's Professor of Chemistry, two chemists, G.M. Richardson and G.M. Dolby gained 1851 Scholarships (1927 and 1929, respectively), with the next (to R.B. Johns) coming only in 1951 after he had retired and become emeritus professor.

The Robertson era saw the recognition of Departments within the university, Chemistry being accorded that status in 1932; formal faculty listing only came some six years later. The 1939 calendar shows this and it is interesting to note that the format and layout used then stood the test of time, being little changed until the late 1960s. Despite administrative and other responsibilities, Robertson appears to have remained focussed on research, shunning the interferences of central administration more than necessary.[12] He and his students worked with minimal equipment and little funding, yet the work was remarkably successful. Much of it required simple compounds, a thermostat bath and burettes for volumetric analysis to the extent that he had a major series of papers covering the *kinetics of halogen addition to olefinic compounds*, and another on *kinetics of aromatic halogenation*. These spanned the time when physical organic chemistry was evolving and the concepts of reaction mechanism were becoming accepted. Sir Christopher Ingold and Sir Robert Robinson were the dominant English organic chemists of the era and most of Robertson's results were published in the *Journal of the Chemical Society*, though he did venture to the *Journal of the American Chemical Society* with 1930 and 1933 papers (Appendix XI). Thus, the period of Robertson's tenure led to him establishing a significant reputation within, but more dominantly outside,

this country.[11,12] Although some belittled the work as fragmented and piecemeal, they failed to recognise the difficulty of performing chemistry in the antipodes with little by way of sophisticated equipment. What is especially notable about Robertson's achievements is that he was *the professor of chemistry who instilled a real research ethos into his students as a matter of routine* with most staying on to gain their Master degree under his tutelage. Thus, while Easterfield drove experiment-based education, it was Robertson who encouraged MSc study and many of the numerous graduates subsequently had a major impact on the development of science and industry in New Zealand.[11,12] He fostered student involvement with the discipline and by the mid-1930s the College boasted a Chemical Society.

The thirty years at VUC saw Robertson supervise more than 100 thesis students and he was fondly remembered by many of them. Prior to the early 1920s, and after about 1930 until the late 1940s, the only degree higher than an MSc was a Doctor of Science and this required a period three years beyond the MSc (five years from a BSc). Searches using the University of New Zealand roll of Graduates (1870-1961)[13] have provided but one Robertson student gaining a DSc degree during this time. This was awarded to Edward Edinborough Chamberlain in 1939. Chamberlain was a demonstrator in 1929 (see Appendix II) and, following his 1928 MSc thesis submission (*An investigation of the nature of* p-*azophenol)*, he joined the Department of Agriculture, becoming a specialist in plant viruses and retiring as Director of the Plant Diseases Division of DSIR in 1968. No DSc thesis submission is accorded him in Victoria's Library catalogue (electronic) but, as he gained no other university degrees, it follows that his DSc was also in chemistry.

The ability to gain a PhD degree was subjected to a brief experiment by Victoria University College in the 1920s and then abandoned until 1946. This trial resulted in six successful submissions to the College[13,14] with degrees conferred by the national university between 1925 and 1931. The first submission was by John Stuart Yeates and entitled *The Roots and Nodules of Conifers* that gave him his PhD in 1925. He had been awarded his MSc in 1923 following a 'second' in Advanced Chemistry in 1921, but he did not stay with the subject. There was no PhD awarded to any candidate studying chemistry during the trial period.

It was only in the immediate post-war era that calls for research to be a central theme of university existence were to the fore.[15] As a result, government made monies available to the extent that the PhD degree was formally reinstated in 1946, with the regulations appearing in both the University of New Zealand and Victoria University College calendars from 1947 onwards. The submission required six copies of the thesis to be deposited and these were subsequently dispersed to the constituent college libraries. It is for this reason that the VUW electronic archive records PhD theses deposited by their authors only from the year 1947. That year saw one in Zoology and one in Chemistry. The chemistry thesis was by Dr. T. J.

(Jim) Sprott, the formerly well-known Auckland-based consultant (T J Sprott & Associates, Consulting Chemists), forensic scientist and outspoken critic of cot deaths in NZ, in his 87th year as this is written. However, his degree was from submission at Auckland University College and awarded[16] in 1949, thus confirming that the VUC-held copy is one of the six submitted to the UNZ. As an aside, it is worthy of note that Jim Sprott's NZ PhD examiner was from Otago University in Dunedin. However, as the examiner's wife was expectant, he was unable to travel and so it fell to Jim to go to Dunedin for the oral[16] – a rail-ferry-rail journey of two days each way!

The Victoria University library holds theses by William I. Taylor, Richard D. Batt, John T. Law and William A. McGillivray from as early as 1947. These appear under the name of the author rather than in the PhD thesis archive and they were deposited by the authors for work supervised by, respectively, L.W. Briggs (Auckland, 1947), S. N. Slater (Otago, 1949), W.H. Parton (Otago, 1949), and W.S. Metcalf (Victoria, 1949). The McGillivray degree is listed as a Massey Agricultural College (Palmerston North) degree in the University of New Zealand roll of Graduates.[13] At that time, the Palmerston North college was not associated with Victoria. It was established as the sixth college of UNZ in 1926 and became a college of Victoria only after the UNZ was disestablished in 1961. Yet Bill McGillivray's successful PhD submission (*Studies on carotene metabolism*) indisputably acknowledges Walter S. Metcalf as his supervisor. Wally Metcalf had become Victoria's second lecturer in chemistry in 1946 and had been associated with McGillivray from the early 1940s as they have a joint publication (*NZ J. Sci. Tech. Sect. B*, **1943**, *25B*, 115-28). Presumably this was from the time when Metcalf was based at Otago University as he had, in turn, been associated with H.E. Fyfe there and had a publication from that institution in 1942 as sole author (*Absorption spectra of mono-, di- and trichloroamines and some aliphatic derivatives, J. Chem. Soc.* **1942**, 148-50). McGillivray must have been supervised from Wellington but resident at the Agricultural College, and so this thesis cannot be regarded as the first PhD at VUC. From the various records, it has become clear that the honour of the first PhD thesis in chemistry at VUC (see Appendix VI) must go to W H. (Hugh) Melhuish (*The quenching of anthracene fluorescence by weak quenchers*) submitted in 1954 and conferred in 1955.[13] Wally Metcalf has the indisputable right to supervizing this study from the acknowledgement given and their 1954 and 1958 joint publications (Appendix XI). Hugh had gained his MSc degree in 1951. After this PhD submission there was a gap of four years before the next submissions and these were by Ghulam Hassan and Ray Carman in 1958, both students under Slater's tutelage. From 1962, PhD submissions became almost annual (see Appendix VI).

From the evidence gleaned and provided above, it follows that P.W. Robertson

gained his reputation at Victoria by supervising MSc student research. Some others of those who gained their degrees under his direction include:[11-13] O.H. Keys (MSc 1931), a DSIR chemist and inaugural editor of *Chemistry in New Zealand*; T.A. Glendinning (MSc 1921) who became a tutor at the Wellington Technical College and second editor of *Chemistry in New Zealand*; N.T. Clare (MSc 1935), subsequently a noted plant scientist and chief biochemist at the Ruakura Animal Research Station; P.B.D. de la Mare and B.E. Swedlund (MSc 1942 and 1944, respectively, both physical organic chemists of high esteem and chemistry academics at the University of Auckland). Peter de la Mare subsequently carried a formidable international reputation as one of the foremost physical organic chemists of his era, returning to Auckland in 1960 from University College, London, as Professor and Head of the Department of Chemistry. He was awarded an Honorary DSc degree by Victoria in 1983. Interestingly, Robertson expresses confidence in his former student by writing in his 1949 paper '*Science at Victoria College*' that[17] '*…. de la Mare, at present lecturer at the University College, London, …. for whom a distinguished career in chemistry is confidently predicted*'.

Among the others worthy of mention is E.P. White (MSc 1938, DSc 1959), who worked at Victoria as the demonstrator until 1940 when he joined the Department of Agriculture and became the third recipient of the NZIC ICI Medal and Prize (1951) for his isolation, purification and structural analysis of sporidesmin, the toxin causing facial eczema in sheep and cattle. W.A. Joiner (MSc 1931), became a DSIR chemist and 1957 NZIC President; H.P. Rothbaum was another distinguished DSIR scientist and Hon. FNZIC; I.R.C. McDonald had a career in the Chemistry Division of DSIR that took him to its Directorship; T.R. Hitchings became a noted Christchurch secondary school teacher and principal and 1968-69 NZIC President; W.E. Dasent returned to Victoria as a lecturer in chemistry and subsequently Bursar and Registrar; and J.K. Heyes returned to Victoria as its Professor of Botany.

Robertson's influence was not simply limited to science as he was unusual among chemistry professors in New Zealand for his deep interest in literature and writing. He espoused the view that science should inform art, and art science, with both being aspects of the whole. He wrote several literary works, the first of which was a series of short stories entitled *A soul's progress: mezzotints in prose* (1920). It covers five periods in the history of the soul of an imaginary young scientist trying to escape a narrow intellectual view of the world. The theme continued in his spiritual autobiography *Life and beauty* (1931),[10] which describes a deep and sensitive thinker engaged in a quest for beauty. Other short stories included *Tarawera in eruption* (1944) and *Odyssey in Wellington Harbour* (1945), the latter receiving critical acclaim. Robertson's interest in the visual arts was expressed in a 1931 article on Christopher Perkins in *Art in New Zealand* that was illustrated by

the latter's portrait of the author.[11]

The Chemistry Department under P.W. Robertson featured in the expansion of the VUC campus. The need for better and larger science facilities became apparent in the 1930s with Biology being in especially cramped space. Funding was received under the first (1935) Labour government for two new buildings, one a biology building (Kirk) and the other for an administration building (Stout). The two of these were built together and opened in 1941, although it appears that the biology building was occupied from early in 1940, perhaps even for the first term of 1940 as planned. There was a link way from this new facility to the west wing which went through the third floor space vacated by a biology laboratory that had housed Professor Kirk's notorious aquarium. It was a homebuilt contraption that was stirred by homemade pulleys and rotors with much creaking and groaning.

Precisely when it was that the Chemistry Department took over the space and moved into the west wing has proved impossible to discover. The period immediately following the move of Biology into the Kirk Building seemed the most logical as all non-essential building expenditure ceased during the war years of the 1940s, especially after the 8 December 1942 declaration of war on Japan. However, the time period has been narrowed to two years from late 1940 to late 1942 from information provided by Joan (Mattingley) Cameron, the 1965-1976 editor of *Chemistry in New Zealand*. She took her first chemistry course at VUC in 1943 with the Chemistry Department housed entirely in the west wing. By then it was the Chemistry Building. The Hunter Building was occupied by other departments. Space was sufficiently cramped, especially in the provision of laboratory benches for students in chemistry that the second year course was restricted to 40 enrolees and the first year with just 36 laboratory work places came under similar threat. Chemistry had two large and four small laboratories, and six staff offices; there was storage for glass and glassware on the ground floor. The Department remained there until 1958, by which time the need for a major new science building, apparent from as early as 1944, had become more pressing and transformed into reality. In fact, the need for a new science building was put at an Education Department workshop in that year of 1944. Permission for a set of plans subsequently was given and they were drawn up in 1948 with the Chemistry Department to occupy the first three floors of the new facility. Robertson was involved with all of the moves to get this recognition and was included in the initial design consultations.

Philip Robertson formally retired from Victoria University College after the academic year ended in late 1949, and prior to any formal decision to proceed with the construction of the new facility. It has been said that his favourite piece of equipment was a half-ounce bottle with a ground glass stopper,[12] and his views on the subject of chemistry at the time of his retirement are found in his silver jubilee review:[17] '*... looking back I can report that chemistry fifty years ago was a fairly*

simple department of human knowledge, about which a single individual without undue arrogance might rightly claim an adequate comprehension, whilst now the subject has become so complex and highly specialized that accurate knowledge must be restricted to special fields. The possibilities of development in even such a brief period as the next fifty years become, in the light of present advances, simply bewildering. And this is true for other sciences also'. Many would have made the same claim in 1999.

P.W. Robertson from a VUW S19 negative

Robertson was appointed professor emeritus and, having separated from his wife, he settled in London where Neil Curtis (Victoria's second Professor of Inorganic Chemistry and a 16-year emeritus who is in the laboratory daily as this is written) remembers him regularly attending seminars at University College when (Sir) Christopher Ingold was Department Head. Robertson died in London on 7 May 1969. He was one of the few NZ chemists to establish a high international reputation that lasted long beyond his working years. It is particularly unfortunate that recognition for this was not adequately accorded to him in his home country; he was elected FRSNZ only in 1950.

A.D. (Bobbie) Monro, from an SCPS photo

Chemistry's first lecturer, Bobbie Monro, spent his working life at Victoria. His teaching was from 1921 until 1959. He remained a lecturer until 1947 when he was elevated to a Senior Lectureship at the time that the college created not only senior and junior lectureships but also the rank of Associate Professor *for a teacher who had attained eminence in the work of his lectureship*.[15] A.D. Monro and J.T. Campbell (Mathematics; appointed 1935) were the first to be promoted to this latter status in 1949 for the contribution each had made to his discipline. The most notable aspect of Monro's career lies with his 'lab boy,' Alan MacDiarmid, who proceeded to an MSc degree with him and then to a PhD in the US as a Fulbright scholar and a second one from Cambridge (UK) as a NZ Shell Graduate Scholar studying under H.J. Emeléus. Alan stated in his biographical notes upon the award of his 2000 Nobel Prize:[18] '*One of my duties as lab boy, when I was not washing dirty lab ware or sweeping floors, was to prepare*

demonstration chemicals for Mr. A.D. 'Bobbie' Monro, the lecturer in first-year chemistry. On one occasion he asked me to prepare some S_4N_4 - beautiful bright orange crystals. When it became time for me to start my MSc thesis, I asked Mr. Monro if I could look at some of its chemistry. He agreed. This resulted in my first publication in 1949. Its derivatives were highly coloured. Colour continued to be one of the driving forces in my future career in chemistry. I love colour. Little did I know that thirty years later this was going to be a key factor which would shape my professional life'. The publication that he refers to appeared in *Nature* in 1949 and is entitled *Preparation of mono-halogen substituted compounds of sulfur nitride* (**1949**, *164*, 1131-2) of which Monro had elected not to be an author. Bobbie Monro is recorded as providing but six papers, the first in 1922 and the last in 1945 (Appendix XI); however, it is not known how many of his students had their work published alone. His final works concerned Taranaki ironsands, for which there appeared to be some industrial potential. The Department's first research fellow, Mr. W.R.B. (Bill) Martin, worked with Monro on this project in the old Hunter laboratories, even after chemistry had moved into its new accommodation in 1958. In 1947, a lecture on *chemical warfare* given by Monro had a major influence in the formation of the VUC anti-war movement.

No expansion of staff in Chemistry under Robertson was thought necessary after the 1921 Monro appointment until immediately after WWII. A Mr. G.S. Israel was appointed a lecturer in Physical Chemistry on November 22, 1945, but he never took up the post and it was Walter S. (Wally) Metcalf (1928-2008), a physical chemist, who actually took up the position in 1946. Metcalf, Chemistry's second lecturer, published little while at VUC but he became much better known after his move to Canterbury University College for the 1955 academic year as senior lecturer in charge of physical chemistry, replacing Hugh Parton who moved to Otago University. Wally's VUC (and CU) studies most notably encompassed photochemical concepts (ultraviolet absorption and fluorescence emissions), and his PhD student, W. Hugh Melhuish, became NZs foremost physical photochemist serving as a titular member of the IUPAC commission on spectrochemical and other optical procedures for analysis.

During these times, the general chemistry course fee of £1-11-6 of 1900 had risen to £4-4-0 a few years after Robertson's arrival and the organic programme was set at one half of that amount. The fees for laboratory work were £3-3-0 for the general course and £2-2-0 for the organic programme, with a £1-0-0 materials charge. However, in 1930, just ahead of the Great Depression, the fee level was doubled and it remained at £8-8-0 until the 1960s with an MSc fee of £10-10-0. The general chemistry fee increased to £30 in 1965 and that transposed precisely upon decimalization to the $60 of 1967.

Chapter Four

The Flagship of Victoria's Science Expands

With Philip Robertson's retirement, the chair of chemistry passed in 1960 to another New Zealander and natural products organic chemist, Stanley N. Slater; he held the post until early 1969. Slater had gained his PhD at Oxford University working with Professor Sir Robert Robinson and came to VUC from Otago University for the 1950 academic year, having been an independent academic there from about 1943. Like Easterfield, he had established himself studying plant extracts and had worked on tutin as well as curcumin and picrotoxin, the first of which continued,

Prof. S.N. Slater (VUW-1651)

Tutu picking along the Hutt Road, Nov. 1958. Neil Curtis (beret), SCPS photo

not simply well into his VUC tenure, but on the same laboratory benches that Easterfield had used in 1906. His first paper at Victoria was published with Horn and Miller during his first year (*Preparation of some 1-chloroalkane-1-carboxylic acids. J. Chem. Soc*. **1950**, 2900-1) and one the following year was with Alex T. Wilson (*Relationship between picrotin and picritoxinin. Nature*, **1951**, *167*, 324-5). Wilson subsequently became a lecturer in chemistry in 1960.

It was during Slater's first eight years at Victoria that most of his research was conducted, and he supervised a postdoctoral, Bob Woods, and two PhD students, Ghulam Hassan and Ray Carman. However, their PhD work was published jointly with R.B Johns and not Slater, as the students were told to seek Johns' support, since Slater was to be preoccupied with the new science building. Bob Woods, the postdoctoral with Slater over 1953-54, worked in the ground floor lab and, for evening work, purchased a home built record player from a departing student – it deterred the rats coming up the open lead-lined drains; something he says was not particularly disturbing at the time. Much mercury was found under the floor when the lab was converted for other use after chemistry's move into the Easterfield Building. Ward Robinson, NZs subsequent foremost 20th century crystallographer, was a lab boy prior to decamping to Canterbury College in the mid-1950s.

Some have said that Slater was a chemist who never moved into the age of instrumentation, but it was the construction of VUC's new science building that really took him away from research and into administration over the period that marked the major expansion of the universities. From Victoria's *House and Finance* minute book for this period, held in the University Archive, it is abundantly clear that he became actively involved with the new building project from March of 1950, almost as soon as he arrived on campus, and his involvement increased as the days went by. He never really returned to active chemistry. The move to expand and renovate the University Colleges reached a head when, in 1952, the University Grants Committee (formed in 1948) asked each college to provide it with a fifteen year building plan. With those available, it was better able to persuade government that new university buildings were a matter of national importance. Expenditure rose dramatically from 1953 to 1959 and Victoria College fared well because of the programme it proposed, and from what it already had planned.[15]

Earlier, at a Conference of the University Colleges in 1944, each College was asked to advise government of their most important building needs. Victoria did this and went to the extent of having sketches drawn for its new science building in October of 1948, but they were for a mere three storeys rather than the seven that emerged in the 1950s. The new science building was not the first VUC post-war construction as that had been the addition of the third level to the two-storey biology block in 1954, the (Old) Kirk Building. The major new science building for chemistry, geography and geology was to be sited on the hillside up Kelburn

Parade. In the 1950s, along Kelburn Parade and through the site for the new building, the College had placed seven US Army steel huts (six for staff offices and one as a classroom). Three of these could not be relocated on site once the work on the new building started. It was clearly stated that the noise from the construction would make life in the remaining huts unbearable – already the windows needed replacing and leaks were almost impossible to repair!

W.E. (Ted) Harvey, VUW 785

W.E. (Bunt) Dasent lecturing, VUW 2-145

The number of students in chemistry and its laboratories had exceeded those in physics, biology and geology, for some time. Thus it was that Chemistry was the flagship of Victoria's science and research. Slater received an annual grant of £1650 in 1953 and 1954 with an additional £200 and £707 as special allocations in the first of those years. It was obvious that, as the dominant core science subject, chemistry needed much of the new building space, as had been presumed in the 1940s, and, as Professor of Chemistry, it was inevitable that Slater featured significantly in setting the final plans, as had Thomas Easterfield some 50 years before him. To cope with student numbers, new staff members were appointed. Slater had organic natural products chemist and Auckland graduate W. E. (Ted) Harvey, appointed a lecturer in 1953 (MSc – Briggs, Auckland; PhD – Todd, Cambridge), and W. E. (Bunt) Dasent, one of his own Junior Lecturers with an MSc degree under Robertson's tutelage, likewise installed in 1954. Bunt had had three years of accountancy training before electing to take his BSc degree and this fact had a major impact on his subsequent career at Victoria as discussed below.

These two staff members were followed in 1955 by New Zealander Brian D. England, a physical/physical organic chemist who had gained his PhD at University College London under the noted E.D. Hughes, and R. Basil Johns, an organic chemist who moved to Australia some four years later. More importantly, Slater persuaded the administration of the day that organic chemistry should evolve strengths in biochemistry, citing the tutin work of Easterfield as an appropriate reason. There had been serious suggestions that biochemistry be brought into the College from as early as 1948 because its presence would strengthen moves to gain a specialist school (especially the second medical school), but

R.B. Johns from an unattributed newspaper cutting, VUW-S19

in 1955 there was no consideration for anything other than it being a sub-branch of chemistry.[19] A senior lectureship was advertised in 1955 and then re-advertised, as no suitable candidate was found. This second call led to the offer of appointment to Richard (Dick) Truscoe, a London-born Pole, in December 1956 two years short of his 60th birthday. He proved the ideal appointee as he had a good publication record and teaching experience over a range of biochemical topics in chemistry, agriculture and medicine appropriate for the general biochemical teaching role. Truscoe was joined in 1959 by lecturer M. H. Briggs who stayed at VUC only until 1962, but it was Truscoe who evolved the teaching programme through to MSc in 1960, with its first research student, Margaret Martin-Smith, under his direction (MSc Thesis: *Preparation and properties of housefly uricase*). At that time, Victoria was the only NZ College other than Otago to teach biochemistry and it featured from second-year level upwards.[15] Its development was facilitated by chemists rather than physiologists, as at Otago.


N.F. Curtis VUW-S19

The inorganic area was further strengthened in 1957 with the appointment of Neil F. Curtis, initially to a temporary lectureship which became permanent the same year. Educated at Auckland College, Neil was (and is) a co-ordination chemist whose researches have played a major role in continuing the Robertson ethos of Victoria having an international reputation in chemistry. He also gained more than an element of notoriety from explosions involving perchlorates. By and large, the appointment of new staff members was geared towards strengthening the teaching ability of the Department rather than building up strong research teams; such ideas were no part of the planning.

One of the successes for chemistry in this era was that of Bobbie Monro gaining support to further his earlier studies of NZ ironsands through the appointment of W.R.B. (Bill) Martin (MSc Vict. 1948) as a research fellow. His task was to analyse samples for iron and titanium for the fledging NZ steel industry, but he also gave some lectures, notably to the '*intermediate*' students, that Neil Curtis took over on appointment. In 1955 Martin published a report on the potential of a New Zealand ironsands industry. He then worked with Fletcher Holdings Ltd. who, in 1956, engaged the American company, Henry J. Kaiser, to carry out a feasibility study for a large electric-smelting steel plant. This was to be located near the extensive ironsand deposit at Taharoa, south of Kawhia Harbour on the North Taranaki Bight (NZ North Island west coast). This research continued into the early 1960s and was carried out in what had been the Physical Chemistry Laboratory of the Chemistry Building ('west wing'); Anwyn Long assisted there as lab technician. The small group saw Monro retire in 1959, but it never transferred into

the Easterfield Building. Martin's crusade for the extraction of iron and titanium from Taranaki ironsands played a prominent, though not in the end decisive,[15] role in the establishment of the NZ steel industry.

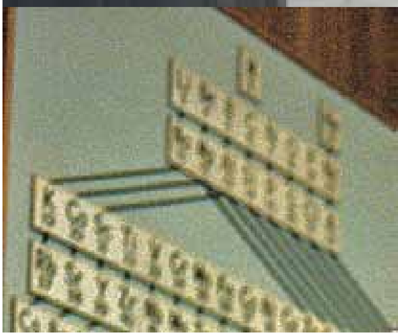
On the educational front, 1957 saw a group of about 30 Indonesian students come to Victoria under the Columbo Plan scheme for the year. To help with the additional numbers Gwenda Sheat (a Canterbury graduate whose sister Sylvia (Sheat) Rumble became a Professor in Chemistry at Massey University) was appointed as a temporary lecturer for one year. The Columbo students provided a significant challenge as they had little chemical knowledge. That same year saw Mok Kum Fun, another Columbo Plan student, here. He had a good chemical background, did his MSc with Brian England, and subsequently became Prof. James Duncan's first PhD student in 1963 (see p. 45). Fun rose to become Professor of Chemistry at Nan Yang University in Singapore.

With the activities of the Chemistry Department growing, early 1955 saw the plans for a new chemistry facility finalized and work on the building start. From 1950, the new space was being planned to hold 500 undergraduate chemistry students, 380 at first-year level, 80 at second, and 40 at third, though the initial ideas of what was needed stemmed from Robertson and the 1940s.[19] The transformation of the needs of core science into a reality fell to those who had constructed Weir and Victoria Houses, namely, the architectural firm of Gray Young, known educational architects. But it was 1955 and the College had no in-house *Facilities Management*. There was no one with a nose for science to provide the essential liaison between the architects and the builders. And so it was that, in addition to his teaching and academic responsibilities, Stan Slater took on, not only the design and lay-out of the chemistry facilities, but also became the unofficial Clerk-of-Works, the on-site man. The role was possible only because of the increased number of academic staff. Neil Curtis recalls Stan being seen, rolls of plans under his arm, busying himself with the design, the construction, and getting what he wanted. The original design set the building at six storeys, but government insisted on one more, as it had for the Hunter Building, and a seventh level was included prior to construction. With the hilly site, onwards and upwards provided the most efficient use of space! The building, the first major one for a university in the post-WWII era, was completed and ready for occupation in 1958. It was named the Easterfield Building.

Chemistry occupied the first four levels of the new building, had a small laboratory area on Floor 4 (Ground was Level 0) for biochemistry and a dedicated radiochemistry lab on Level 3. Geology took the upper levels, but it seems that mathematics ousted geography in the initial move into the building. Slater was rightly proud of the new facilities. He had had the floors constructed in teak parquet and the benches made from kauri; each laboratory was fitted with fume cup-

The Easterfield Building 1958 (VUW 2-140)

boards, some large for multiple use and some small for the single user. There was a separate goods lift and a fully insulated safety laboratory with fume chamber and spark-proof mercury-rocker electrical switches. The chemicals store was on Level 0 and adjacent to the loading bay that was set back from Kelburn Parade. In hindsight, the defect in design was in having the solvent store located in a rear underground room accessed through, but behind, the chemical store. There was a separate acids store close to the goods elevator. The teaching laboratories included a large and a small one for First-Year, and the Inorganic labs were on Level 1, Organic on Level 2, Physical on Level 3, and Biochemistry on Levels 3 and 4. All but the inorganic and biochemistry labs had a preparation room. The Chemistry Library was housed on the second floor. The uppermost storey housed a building-wide Council Chamber whose windows and small balconies, sadly, saw more than one suicide. Construction overruns necessitated economies. These were achieved not with the teak flooring but with the windows, which subsequently plagued the inhabitants for many years to come. The building was served by a resident care-taker, Mr. Ron Burge, whose apartment was located in the north-west quadrant of the ground floor. What the plans for the Easterfield Building had not allowed for



The EA006 lecture theatre, Dasent lecturing (VUW 2-145) and (lower) the illuminated periodic table (from VUW-S19)

was the increase in the number of staff that took place before it was occupied. Even on moving in there were insufficient offices and the preparation rooms on levels 0, 2 and 3 were used as such. When the design for the building was being set chemistry had four academic staff, but there were ten at the official building opening. The lack of adequate office space pervaded the more than forty years that the Department was in the building.

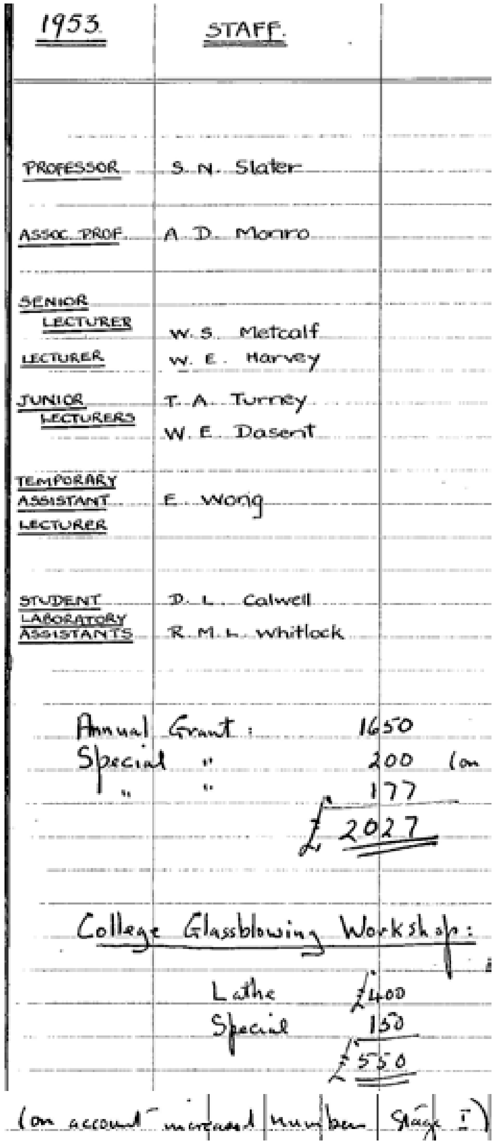
The main lecture theatre, EA006, was also located on the ground floor, but it protruded to the east as an adjunct to the main construction. This and a smaller second-floor theatre, EA206, each had an adjacent preparation room for demonstration materials to be prepared and provided to the lecturer. The large (180 seat) theatre was endowed by the local Branch of the New Zealand Institute of Chemistry with a large illuminated periodic table that was affixed to the wall alongside the blackboards. Every element was able to be lit up at the flick of a switch from the

elegant podium. Sadly, it was discarded (without consultation) when the lecture theatre was renovated at the end of the 1990s. The smaller Level 2 lecture theatre remained with its original furnishings (save for a tap or two) until after chemistry moved out of the building in 1999. Although padded cushions and IT facilities have been added, the central fume cupboard that opened both to the theatre and the prep room remains, but is sealed and still holds several molecular models!

According to Slater's archival records (as illustrated opposite),[20] the set-up grant from government for Chemistry in the Easterfield Building was £12,721-18-8 and the budget was very carefully divided among the areas of the Department and their various needs. These totalled to £12,735-0-0 (Biochemistry £2083, Advanced Chemistry £2000, Radiochemistry £200 and the Workshop £45, *etc*.). Thus, the Stage I and senior laboratories were budgeted and spent £2942 and £3383, respectively, from figures based upon student number projections that subsequently proved to be overestimated. The total refurbishment allocations from Victoria College between 1950 and 1960 were £11,653, but by 1959 the Chemistry Department was in deficit by £3275. Despite this, Slater had £600 budgeted for a 'chromatograph', £312 for a Mettler balance and £6000 for establishing infrared spectroscopic facilities in further submissions of 1960. It is worth noting that biochemistry was always given a separate budgeted sum to operate with. Perhaps this shows a favourable disposition that Slater had for the area, or perhaps he recognized from the outset that it would evolve into a separate department given the impact that the Pauling α-helix and the Watson-Crick DNA structure were having at that time.

It is interesting to note that the 1958 sum of £12,721-18-8 translates to $579,255 in 2012 NZ dollar terms using the CPI historical calculator on the Statistics NZ website (http://www.rbnz.govt.nz/statitics/ 0135595.html). It is almost inconceivable to imagine setting up a new facility with such a small sum today. The stark reality of the 1958 situation was that the Easterfield Building was the first major science building to be constructed in the post-war era. Neil Curtis has set the record straight by advising that it was Slater and Monro who set the budget, selected and ordered the equipment based upon laboratory norms of the 1940s, with almost everything coming from 'Gallenkamp', the major supplier of laboratory equipment of the day in the UK. Instrument purchases were almost non-existent and in comparison to the set-up grants allocated for the facilities constructed subsequently at the other NZ universities, Victoria had not fared well. Its chemistry academics used this to explain, in their view, being left behind in the race to post-war modernization and instrumentation.

This is how the Department of Chemistry settled to its new home in 1958 with its ten academic staff members and three junior lecturers. R. Archibald (Arch) Matheson, a 1953 MSc graduate of Victoria from work with Metcalf and then a



1953	STAFF.
PROFESSOR	S. N. Slater
ASSOC. PROF.	A. D. Monro
SENIOR LECTURER	W. S. Metcalf
LECTURER	W. E. Harvey
JUNIOR LECTURERS	T. A. Turney W. E. Dasent
TEMPORARY ASSISTANT LECTURER	E. Wong
STUDENT LABORATORY ASSISTANTS	D. L. Calwell R. M. L. Whitlock

Annual Grant : 1650
Special " 200 (on
" " 177
£2027

College Glassblowing Workshop:
Lathe £400
Special 150
£550

(on account increased numbers Stage I)

The 1953 staff list and finances shown in Slater's roll book for the 1953-1955 years; the parenthesized words refer to the special grant (VUW-S19)

1957 PhD at Canterbury University, was appointed to a physical chemistry lectureship and R. H. Briggs to one for Biochemistry in 1958. The 4th floor biochemistry lab was the first to be occupied early that year, ahead of the building completion when chemistry made the move from the old Chemistry Building (west wing). Biochemistry had its student entrants limited to 14 in the second year course and it took on its first MSc student in 1960. The building was officially opened by the then Prime Minister, the Hon. Keith Holyoake, on June 30, 1959, and named the Easterfield Building after the founding professor. The naming of buildings after noted professors is something that Victoria introduced to New Zealand. The concept was put forward by the noted Pacific historian Prof. John C. Beaglehole in 1958. This, of course, then required that the original building, the administration block and the biology block also be named, and so it was that Hunter, Stout and Kirk emerged, though not without serious debate over the ordering of the first two.[15]

The Department moved into the new building somewhat less than a year before the official opening and that occasion was celebrated with another and, as it happens, last *Conversazione*. Displays were provided in the laboratories as illustrated by that in the small Stage I laboratory. From then onwards other extra-curricular activities by way of teachers' evenings and (later) afternoons followed. What is thought to be the sole concentrated programme ever offered by the Chemistry Department

The Conversazione displays, Small Stage I lab, 1959, VUW-857

was a two week ***School on Laboratory Instrumentation*** that ran in late 1963 with contributions from Prof. Duncan, and Drs. Craig, Harvey, Hay, Wilson and Matheson.

It is noteworthy that Prof. Slater began a 1955 report on the possible development of applied science at VUC by questioning whether it was *proper* for this to be cultivated in the College.[15,19] Yet some five years later the Hughes Parry report (of 1959) berated the universities for ignoring the applied sciences. Despite the pressures, VUW's science faculty, which carried the formidable trio of R.H. Clark (Geology), S.N. Slater (Chemistry) and D. Walker (Physics), did not establish a separate faculty. Instead, it made a number of appointments at the Senior Lecturer level across the disciplines, but there was nothing for chemistry as it already had *Applied Chemistry* as a 3rd-year offering on the statute books. Alex Wilson took this on in 1960.

In 1961, the University of New Zealand was formally disestablished following the Hughes Parry report of 1959. By then, each of the colleges operated essentially independently and set its own curricula leaving no logical reason why they needed to be linked as a national institution. Thus, four independent universities and two agricultural colleges were established. The University of Auckland, Victoria University of Wellington and Massey College, The University of Canterbury and Lincoln College, and The University of Otago were created by separate acts of parliament that were passed in November of that year (the VUW Act was passed on 8 November 1961). By 1962, Victoria University College had become the independent Victoria University of Wellington and the Chemistry Department had 23.5% of the enrolments in science. PhD registrations, which had numbered eight in 1958, had doubled with the new building and the expansion of science and stood at sixteen in 1962. Slater geared the worldwide popularity of science to the increase in student numbers and the new university status. He expanded the staff numbers, hiring new staff with research interests different from those of present staff members. Diversity was not simply thought to be good, it was the aim. By the time Stan Slater left the Chemistry Department at the end of 1968 there were nineteen full time staff members. Thus, John T. Craig and Robert W. Hay joined

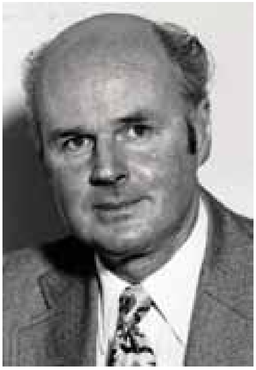
the new university from 1962, with Malcolm D. Carr (1964) and Brian Halton (1968) adding to this complement of organic chemists. James F. Duncan (1962), R.G. Burns, Alan G. Freeman (1964), Gary R. Burns and Alan M. Taylor (1968) increased the inorganic area, while Edward P.A. Sullivan (1965), John W. Tomlinson (1966), Allan F.M. Barton and Martin Viney (1968) were new physical chemists. The retiring Truscoe and departing Briggs had been replaced by F.J. Darby for the 1963 academic year, and he was joined by John N. Smith a year later, in 1964. Alan G. Clark, biochemistry's first PhD student was appointed lecturer upon the completion of his degree in 1967 to replace Darby who moved on at the end of 1966. The delightful and engaging Truscoe remained at Victoria for a protracted period in a semiretired role and was seen almost daily until the mid-1970s.

The increase in staff marked a major change in the nature and operation of chemistry. Whilst recognition of its specializations had been evident for many years, it was only during Slater's headship that the growth in student numbers and the development of research came to the fore in chemistry's distinct areas. The need for more recognition of these areas led to independent professors with James Duncan (1921-2001) becoming the second professor of chemistry (1962) in a chair entitled *Professor of Inorganic and Theoretical Chemistry*. The university had agreed to new chairs in Theoretical Chemistry and Nuclear Physics in 1961 and Duncan fitted to the joint designation. The need to strengthen biochemistry was clear and John N. Smith was appointed as its first (and last) professor in 1964. However, in comparison with the chemistry sections, biochemistry was short of space, had reached its student intake limit of 14 in its first year of operation, and remained 'full'. In 1966, this was referred to as *the bio-chemical emergency* – the Biochemistry III laboratory moved into the second year space on Level 3, and the second year lab was run[19] using the senior organic facility on Level 2. Samantha Campbell has recorded that two MSc students carried out their research using laboratory space in Truscoe's office.[19] Physical chemistry, which had three staff members, gained the fourth chair in chemistry to which John W. Tomlinson (1927-2002) was appointed and occupied in 1966. With Slater an organic chemist and having four sub-professorial colleagues under him, there was no justification for a chair in organic chemistry at that time.

Prof. John N. Smith
VUW-S19

As noted earlier, Slater carried out the bulk of his research whilst employed at Otago and published no research work from Victoria after 1956. His involvement with the institution's administration that took him through the major building phase abated and then increased. He was appointed part-time Assistant Vice-Chancellor in 1964, while retaining his teaching and administrative responsibilities in

chemistry. His AVC position became permanent from the beginning of 1969, perhaps accounting for the author's appearance as the sixth academic organic chemist a few months ahead of that formal and permanent move. Perhaps Slater's move was in the wind when he successfully argued for an expansion of the chemistry professoriate, but his 1964 move, albeit part-time, denoted the beginning of a chapter in the history of the Chemistry Department with staff debunking to the senior administration.



Bunt Dasent in later life
SCPS photo

Slater did not go alone. There had been difficulties in the university accounts section and, because of his training in accounting matters, Bunt Dasent was asked to provide assistance, formally as an assistant to the Vice-Chancellor, but in essence to George Culliford, the Assistant Principal.[15] And so, with Slater, he took on a part-time administrative role in 1964. The accounts had been the responsibility of the institution's assistant registrar (finance), but he failed to submit the necessary annual accounts to the auditor general. This was to the extent that the university was threatened with being named in parliament. The finance registrar was moved to a new post to take charge of publications *for health reasons*, apparently unknown to him. Dasent was appointed as full-time bursar, but in 1972 he returned to chemistry as a Reader. However, the university's registrar, L.O. Desborough, retired in that year and the then Vice-Chancellor, D.C.B. (Danny) Taylor, combined the bursar position with the registrarship so as to give the position more involvement in policy matters. Bunt was appointed to this new position, though it seems that this was something of a surprise to him as it is said he did not apply for it. He had left the administration because he found working in the VC's department increasingly frustrating.[15] Nevertheless, he was persuaded to administer full-time and became Registrar in 1973, then Pro-Vice-Chancellor in about 1978. The registrarship then went to yet another chemist, Ted Harvey. Initially this was on a part-time basis but it became full-time and permanent from mid-1978. Dasent's claim to fame in chemistry was the publication of his books *Nonexistent Compounds: Compounds of Low Stability* (Marcel Dekker, 1965) and *Inorganic Energetics: An Introduction* from Penguin in 1970 and as a 2nd edition with Cambridge University Press in 1982. Slater formally retired in 1975 and Dasent in 1986.

With Slater's involvement in matters administrative, much of the day-to-day running of Chemistry had to be devolved. W. E. (Ted) Harvey became the *de facto* day-to-day departmental leader. It was he who supervised the training of the technical staff (the earliest entry was for a school leaver as a technical trainee) through the national Technician Certification Authority and Wellington Polytechnic, as it

Harvey in another role [from News VUW, **1976**, *1*(1), 18]

then was. He was also responsible for the purchase and supply of chemicals within the annual budget. This was at the time when few materials came by air-freight so that a single annual order was placed in September with arrival at any time from early December to mid-February. He had the perspicacity to add routinely to the stock of chemicals so that the store holdings were built up over the years. His success and negotiating prowess led to this annual order becoming a university-wide affair with the stocks of useful chemicals held then exceeding those of the present day.

Chapter Five

Divide and Rule

With four professors in chemistry it was inevitable that there would be rivalry, usually, though not always, friendly. Each one argued for a greater share of the departmental grant, essentially the sole source of funding for the entire chemistry operation. The monies that came from the central administration came, in turn, from a government quinquennial grant to the university set by the Universities Grants Committee (UGC). The UGC allocated each institution a 'block grant' based upon recurring costs, varied as needs be. The administration made no charge for rooms, power, maintenance or salaries and the like, as these were all met from its central fund. The UGC also had a separate fund for non-recurring expenses that evolved into the source of grants for major research equipment; in chemistry this was dominantly for instrument purchases. It became the Research Grants Committee with inaugural chairman chemist Prof. Hugh Parton of Otago University. Thus, it was Slater who cut the financial pie among himself, Duncan and Tomlinson. Biochemistry (and Smith) had had a separate budgeted allocation from its inception. For fairness, Slater allocated a set amount of money to each academic, PhD and Honours (MSc) student for their research expenses in decreasing amounts, though the student allocations were under the control of the supervisor. However, beyond this, each professor handled the funds for his area in whatever way he thought best. John Smith (and biochemistry) appear to have been the least well-funded, but then it was also the underdog when it came to space and this had to have a major impact on the number of researchers taken on. Nonetheless, by 1968, there were fourteen

postgraduate and thirty-three undergraduate students in biochemistry.[15,19] With the increase in chemistry postgraduates through the late 1950s and into the 1960s, a system for their distribution among the various staff had to be put in place. It was Slater who required the potential students to meet with staff, discuss project work and signify their choice. Later this was modified to require discussions involving two or three areas of the department and it has remained in place to the present time with but minor honing.

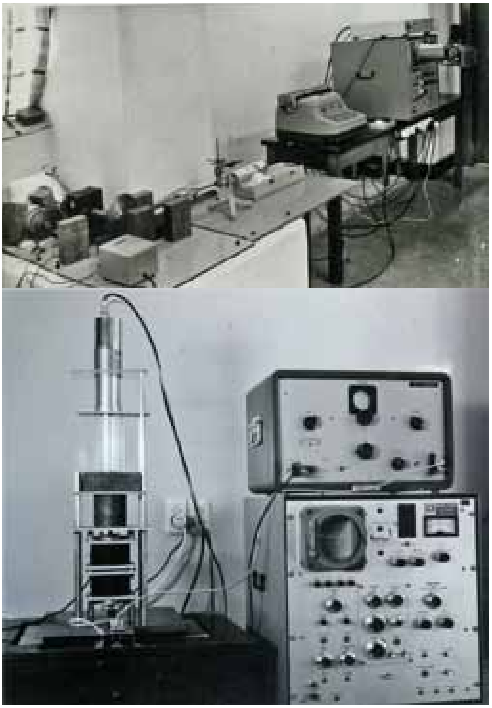
The space constraints on biochemistry required that the second-year lab course be held in a chemistry laboratory. Given the view that the chemists regarded biochemistry as another branch of the discipline just like inorganic and organic, it was the organic area that was used in the evening (evening classes had ended in 1926). During one winter, the deteriorating windows were repainted in the evenings when the lab was in session, much to the dismay of the students and staff. The biochemists rightly disputed the view of their discipline held by the chemists as their approach was, and is, different - something that chemists did not understand. It is not surprising, then, that John Smith was none too enthusiastic. He successfully argued for Biochemistry to become an independent Department, got Slater on his side and, from the beginning of 1969, Biochemistry was independent, though still in Easterfield. A section of Level 6 was redeveloped subsequently for it, but on Smith's retirement in 1984 the biochemistry chair was disestablished; pressure for a re-integration with chemistry emerged but failed. Biochemistry remained on Levels 3, 4 and 6 until it merged with the Botany and Zoology Departments to form the Biological Sciences of the 1980s. The merger saw the entire biochemistry operation move into the New Kirk Building and its strengths have remained in the biosciences arena which has fared well since.

With the formal departure of Slater to the administration in 1969, the headship of chemistry passed to the next professor by seniority, James Duncan, as had been set for every department many years before. Duncan had come to Victoria by way of the Atomic Research Establishment in the UK and the University of Melbourne. He was an expert in radiochemistry, an area that was thought to be the saviour of scientific research by many at that time. He was quick to establish a collaboration with Ray Golding, a DSIR scientist who subsequently moved to a chair in chemistry at the University of New South Wales.

James Duncan, VUW-S19

Duncan's arrival in 1962 marked the beginnings of serious radiochemical study in New Zealand. He brought the components of a Mössbauer spectrometer (a new spectroscopic technique discovered in 1957 that uses the absorption and emission of gamma rays in solids) with him and was soon successful in raising an $80,000 grant from the US Air Force Office of

Hyperfine and Nuclear Spectroscopy Conference: James Duncan (5th from left)
(courtesy of Ken MacKenzie)



Victoria's first (upper) and second (lower) generation Mössbauer instruments, VUW-S19

Scientific Research. This allowed for the purchase of an improved Mössbauer spectrometer system, for the appointment of postdoctoral and student support, and brought Dr. R.E. Bailey and his chemist wife Marcia from the US in 1966 to spend almost two years here. Mössbauer spectroscopy was subsequently introduced to Auckland University where there was a significant allocation of space for radiochemistry. James Duncan organised and hosted a major international conference on Hyperfine and Nuclear Spectroscopy at Victoria in October 1966, the first notable international chemistry congress at this institution.

Over an eight year period James Duncan supervised some thirty graduate students, research assistants and postdoctoral fellows. He and his re-

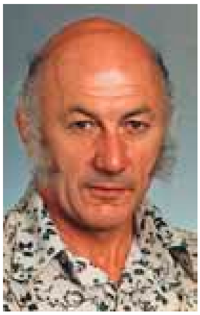
search group made leading contributions to the field over many years. Starting with his first PhD student Mok Fun, they measured and published ^{57}Fe Mössbauer spectra and parameters for numerous iron-containing compounds and minerals, and used the data to develop an enhanced understanding of the structure and chemistry of these materials. Duncan led and supervised a strong research group of MSc and PhD students in a wide range of fundamental and applied research programmes. Importantly, David J. Stewart, who submitted his PhD thesis in 1967 entitled *The role of vapour phase transport and the effect of reaction conditions on the formation of spinels*, was the first Maori doctoral candidate in chemistry. James extended his research to solid state chemistry and an understanding of the chemistry, structures and reactions of clay-based ceramics, minerals, fertilizers, NZ ironsands, even of teeth and tooth decay. He was proactive in establishing research collaborations with the then DSIR and industry, and advanced the ideas of applied chemistry teaching into reality at Victoria. He was elected FRSNZ in 1968.

In total, James Duncan published some 57 papers at Victoria. He was instrumental in setting up the science faculty analytical facility and was responsible for introducing geochemistry (with staff members R.G. Burns, 1964-68; Alan M. Taylor, 1968-81; and J.H. Johnston, 1975-) that was subsequently lost to the geological sciences in the early 1990s. But James had more strings to his bow. He recognised the need to stimulate minds of secondary school students and, in 1964, organised the first Wellington Secondary Schools Science Fair. The movement grew over the years and is now held annually in all the main centres of NZ with a national RSNZ-promoted final sponsored by NZ corporate organizations. Duncan was appointed Patron of the National Science Fair when it moved from his enterprise to the responsibility of the RSNZ. After Duncan arrived in the Department he was, apparently, instrumental in setting up an undergraduate and research students *Chemistry Club* to engender good camaraderie. Moreover, when Brian Shorland became an Honorary Research Fellow in Biochemistry shortly after James became Head of Chemistry they set up (4 June 1970), at Duncan's behest, an alumnus society inaugurated as '*The Robertson Society*' with Shorland as its President. Both clubs survived for several years providing extracurricular lectures and

David Weatherburn & Isabella Pomer, SCPS photo

social activities for the undergraduate and graduate students and the alumni of the Department. He was an enthusiast for the occasional '*Open Day*' that the university provided for the populous at large. These were initially occasions when visitors could tour campus and attend a lecture (or part thereof) to the annoyance of the lecturer. Ultimately these transposed to a Saturday event with widespread activities and informal lectures and demonstrations – the Chemistry Magic Shows provided by David Weatherburn and Isabella Pomer always being oversubscribed.

James Duncan was forward thinking and encouraged the senior public and private sector to identify, consider, and debate future issues likely to be of major significance to NZ and its people. He was a foundation member (1969-74) of the National Development Council of New Zealand persuading Government to establish the Commission for the Future (1975), which he then chaired. He was awarded an OBE in 1975. The demise of the Commission in 1982 came because of predictions contrary to the policies and expectations of the Muldoon Government. Believing in the need for this type of thinking, James then established the NZ Futures Trust, a charitable organisation that continues even today in promoting the difficult quest of getting people to think more about the long term effects of current and proposed policies and developments. Yvonne Curtis, the wife of Neil, has spent many years serving this Trust. As the years passed, James became disenchanted with the direction of the university administration and the needs of science, and spent increasing proportions of his time with his 'outside' interests including authoring a book of *Options for New Zealand's Future* (1984) that presented many of the 'future' arguments and conclusions.



Stuart I. Smedley
VUW-S19

By 1980, the appointment of professors to head departments had run its course. There had been claims of unfair representation, lack of accountability (especially in nominating junior colleagues for promotion) and the general view that change was needed. This led to the demise of the autocratic Head and, in 1981, s/he was replaced by an elected Chairperson, selected from among the more senior academic staff. The first such Chairperson (man was not to be used) in Chemistry was Dr. Stuart I. Smedley, a Senior Lecturer and physical chemist who had joined the staff in 1971. This was five years ahead of James' retirement (the end of 1986) when the Chair in Inorganic Chemistry passed to Neil Curtis who had been appointed to a personal chair in 1971. Neil had the '*and Theoretical*' removed from the title on assuming the post under the then historical right of ascendancy – but more on Neil later.

The physical area became John Tomlinson's responsibility on his arrival in 1966 and he had three colleagues to assist him, though Brian England was as much

a physical organic chemist as was P.W. Robertson. John was appointed to Victoria because of his expertise in the field of electrochemistry. He had gained his experience and reputation working with molten salts at high temperatures from study with C.A. Angell and J.O.M. Bockris, the latter his PhD supervisor. Following his graduate research, he gained postdoctoral experience at MIT and then returned to Imperial College as a Reader in Metallurgy. It was there that he tackled such phenomena as the solubility of water in molten sodium silicate and the electrical conductivity of molten iron oxide - physical chemistry under exceedingly challenging experimental conditions. He gathered around him a group of electrochemists with interests in research at high temperatures and pressures, and persuaded the Science Faculty to establish a Joint Mineral Sciences Research Laboratory. This it did with collaboration between the Chemistry and Geology Departments, and for many years there was study of mineral systems at high temperatures and pressures. Cliff Snell, a physical chemistry technician, moved to this new facility with the geologists in the Cotton Building, formally becoming a Faculty employee. John Tomlinson employed Chemistry's first electronics technician, Colin Heath, and made his services available to departments who needed assistance. Subsequently John nurtured the Electronics Facility into existence as a university entity and had Colin appointed as its Head. John had eight academic staff appointed to his area over the 1967-75 period of whom four (Barton, Viney, Sinn, and MacDonald) stayed for only a short time (Appendix I). All but Viney (for whom there is no subsequent information) built admirable academic careers elsewhere. Not all this apparent growth was empire building as Brian England took his own life in May 1968, Matheson took up a readership at Otago University in 1971 and Sullivan returned to Australia (the New South Wales Institute of Technology) in 1972.

Prof. John Tomlinson
VUW-S19

John Tomlinson believed that the teaching laboratories should, wherever possible, have research quality equipment and that experiments should reflect modern trends as much as traditional fundamental techniques. The experiments in physical chemistry were carefully designed and always seemed to work, testimony to the preparation that he always insisted upon. Very soon after his arrival he instigated course work on statistical thermodynamics that was not provided at Victoria at that time, and subsequently he termed it non-classical thermodynamics. Importantly, he allocated a component of the sub-discipline to each of his colleagues for them to manage, thus maintaining a high standard across the entire area. As a researcher, Tomlinson performed most of his work before he came to Victoria as he generated few publications here. He preferred to encourage his junior staff rather than be active himself. Nonetheless,

he did some good high temperature-high pressure studies with his PhD students Eddie K. Mroczek (PhD thesis: *An electrochemical study of hydrothermal reactions at elevated temperatures*) and Bruce G. Pound with the latter's 1977 thesis (*The polarisation behaviour of silver in potassium hydroxide solution at elevated temperatures*) giving three of his seven publications. In 1969 John hosted a one-day meeting and dinner at Victoria with the title '*Chemistry of Solutions and Melts at Elevated Temperature and Pressures*' as a Chemical Society (London) event with the then President, (Sir) Ronald Nyholm, giving the plenary lecture. As time passed John developed an appetite for debate (some might even say that winning an argument was more important to him than the issue itself). Indeed, as an administrator, his meeting strategy was simple and effective. He would argue vehemently against proposals about which he had little passion before finally giving way and then, when there were issues about which he felt strongly, he would simply remind people that he had yielded before and now it was his turn to win. Yet he had a profound sense of fair play, and his manipulation of the *meeting process* to achieve what he saw as the correct outcome was *within the rules of the game* as he saw things. He added to the chemist-cum-administrator clan by taking on the role of Deputy Vice-Chancellor from 1978 until the end of 1983 and he served in all the major faculty roles, including the Chairmanship of the Department during 1987-89. He retired at the end of 1990 and the Chair in Physical Chemistry at Victoria University was disestablished.

Taking over the headship of chemistry from the beginning of the 1969 year, James Duncan was soon under pressure as Alex Wilson announced his departure for the new Waikato University, where he was to be responsible for establishing a faculty as inaugural Dean of Science. Organic chemist Malcolm Carr, whose expertise was in the teaching of chemistry at the school-university interface, went with him as did the Department's long standing glassblower and Head Technician, Bob Barbour. Physical chemist Martin Viney then announced that he, too, would leave. With Carr moving on, organic chemistry was down to four staff and no professor. Thus, it fell to James to argue for replacements, and the need for a professor of organic chemistry to restore balance was somewhat forcefully advanced by Ted Harvey. The physical area under John Tomlinson gained Ekk Sinn, Nigel Field and Stuart Smedley over three years but, more importantly, James succeeded in having a chair in organic chemistry created. Thus it was

Alex Wilson and Malcolm Carr at their 1969 farewell (Harvey at rear), from VUW-S19

that, in 1970, the organic position was advertised, two applicants interviewed, and carbohydrate chemist and Scotsman Robert J. (Robin) Ferrier appointed as the first Professor of Organic Chemistry in NZ. He arrived in October of 1970 to give chemistry at Victoria a professor in each of its essential sub-disciplines. The tradition of organic natural products chemists in NZ and at Victoria was too strong, for the university to see beyond it to the future and, like the chair in physical the position was disestablished upon Ferrier's retirement in January 1998.

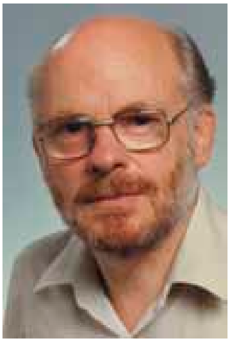
The arrival of Robin Ferrier towards the end of 1970 saw a supposed balance of the research interests in the Department with a Professor for each sub-section of the discipline. But this was far from the reality that eventuated. James Duncan had a penchant for the evolution of Analytical Chemistry, a recognized sub-discipline of chemistry in North America and many other countries, but one that has never attained an independent status in New Zealand. John Tomlinson saw High Temperature-High Pressure studies as aligning the appropriate sections of geology and geochemistry with his speciality. In contrast, Robin Ferrier made it clear that in his view organic chemistry needed to evolve strengths in carbohydrate research and that NZ needed a pharmaceuticals industry.

Robin Ferrier came to VUW from Birkbeck College of the University of London. He had gained his PhD from the University of Edinburgh in 1957 and then joined Birkbeck College, where his focus turned from polysaccharide chemistry to synthetic and mechanistic studies of monosaccharide compounds. His time there saw him successfully nurture ten PhD students, but during this period he took postdoctoral leave in Berkeley working with Melvin Calvin at the time the latter was awarded the 1961 Nobel Prize for Chemistry. At Victoria, Robin continued his work on carbohydrates as '*normal*' organic chemicals, specializing in using them as starting materials for the synthesis of non-carbohydrate compounds of value in medicine. A further eleven students gained their PhDs with him during his tenure. Throughout his career, Robin published extensively in peer-reviewed international research journals, producing over 180 papers, reviews and books. He discovered two new reactions in the area of unsaturated sugars, each of which became known as '*the Ferrier Reaction*', with the obvious ambiguity never having been fully resolved as far as this writer is aware.

R.J. (Robin) Ferrier
VUW-S19

Robin Ferrier brought to Wellington the expectations of an English (Scottish) professor. He was all for collaborations with colleagues within and beyond the Department, but always these had to have him as the project leader. One could even say that the European pyramid concept with the professor at the top, his juniors looking after the day-to-day running of the research group and the postdoctorals

and graduate students below them, would have suited him more that the quartet comprising Harvey, Hay, Craig and Halton. Sadly for Robin (and perhaps for those who might have had successful collaborations), this was not the way chemistry in New Zealand could, or should, advance. Colleagues within chemistry and among the biochemists found the structure alien to their way of thinking and went their separate ways. Among the organic chemists, it was Ted Harvey who ruffled Robin's feathers most, after all he had essentially been in charge of 'organic' for many years, yet was not appointed to its chair. He was unwilling to bow to a dictator, as he saw matters, and relationships were strained for a number of years. Bob Hay wanted to control his own empire by taking charge of the monies allocated him by the Head for research as was the norm elsewhere. However, while the organic budget broke into these independent allocation for each staff member and his students, Robin insisted that it remain a single entity to meet fluctuations caused by the different staff. This was based on the idea that an expensive year by one could be carried by the others and, in general, it worked well. Thus it was that Ferrier did his best to sail the 'organic' ship with John Craig, Brian Halton and Ted Harvey. Bob Hay had left at the end of 1971 for his homeland of Scotland in a career-enhancing move – to a Chair in Inorganic Chemistry, initially at Sterling University then later, after that university's closure, at St. Andrews.



John Craig VUW-S19

Brian HaltonVUW-S19

Chapter Six

Assistants, Instruments and Technicians, and Secretaries

Assistants

The early history of Victoria College saw the appointment of professors and lecturers but it seems that the growth of the institution was based on the expectations of a few staff giving their all. Thus, in 1909, apart from physics professor Thomas Laby, Charles Cotton and F.P. Wilson entered the institution as lecturers. Wilson was to lecture in economic history and geography *with a view to the Commerce degree*[15] while Cotton was to *lecture in geology and also give assistance to the Professors of English Language and Literature, Classics, Modern Languages, and Mathematics as well as providing Professor Kirk (biology) with an assistant*.[15] In 1909, ten years after its opening, science had three assistants or demonstrators, one of whom was allocated to chemistry. And so it remained until 1928 when Bobbie Monro moved from his role as Assistant and Demonstrator into the first chemistry lectureship. Although Demonstrators and Assistants were employed from the time of Professor Easterfield, it was only in 1944 that there was more than one (and the second was temporary; see Appendix II). Mr. B.E. Swedlund took up the post in 1944 and H.D.C. Waters was employed that year and also in 1945 as a temporary assistant. Thereafter, with WWII ended, the era of the Junior Lectureship opened and chemistry had two such positions in 1948 and three in 1949. Initially designed to provide New Zealand's brightest and most promising students with a start on the ladder of academia, they changed from early 1970 to providing funding for those

good students who failed to gain a UGC postgraduate scholarship for doctoral study. By 1970, the UGC allocation was restricted to the top 100 candidates across all disciplines nationally, based entirely upon examination results gained for the Honours degree.

In any event, the 1946 Junior Lecturer, Bernie Swedlund, retained the post until 1952 and subsequently had a notable career as an academic organic chemist at the University of Auckland. He was joined in 1948 by A.R. Caverhill, and both of them by H.D.C. Waters in 1949. Generally, there were up to three Junior Lecturers through to the mid-1970s though sometimes four and occasionally five, as the longer serving of them completed their PhD writing and examination process. With Alex Wilson and James Duncan carrying out research using radioactive isotopes, a junior lectureship for an *Assistant Radiation Safety Officer* was created and the incumbent's role was to monitor the use and storage of the isotopes in the third floor laboratory. The first of these PhD candidates was Peter Morris (1965-68) and he was followed by Alan Langdon, Ken Perrott and, finally, Alan Browne. By the mid-1970s there was little or no isotope work undertaken and the post became superfluous to requirements. Nonetheless, the radio isotopes were held in the 3rd-floor concrete safe for many years prior to official disposal by the National Radiation Safety Laboratory, through official sinking (embedded in concrete) at sea. The last of the Chemistry Junior Lecturers, Clay Cardile and Stephen Henderson, successfully submitted their PhD theses during 1985. Despite the removal of these positions from science, the Chemistry Department was able to retain some of the salary component and a number of *Teaching Assistantships* were created. These allowed for some continuity in research through until the late 1990s with the various graduate students able to work within the allowable limits for demonstrating and tutoring, and able to complete a PhD degree on full-time registration. Despite these various teaching assistants, there was little by way of technical assistance until well into the 1960s – but there was little by way of instrumentation then either.

The number of assistants dropped after Robertson's retirement and Slater's appointment, with Mr. Bernie Swedlund the sole incumbent in 1951. As far as the accessible early records show, the first technicians came in the early 1950s. Mr. Bob Barbour was appointed as Chemistry's first glassblower in 1951. The position was, and remains, an institution one and not a departmental appointment. Bob came from Scotland and also served as the chemistry store man and (subsequently) senior technician. He had worked in the nitroglycerine industry during WWII. Monies for the glassblower's lathe are noted in Slater's hand written records from 1953, with £400 allocated that year and continued until sufficient was accrued.[20] Prior to Slater's arrival, glassblowing needs were attended to by the academic staff, a skill required by every experimentalist in the early days. Arch Matheson, a 1953 MSc graduate and subsequent staff member, recalls Barbour's presence while Neil

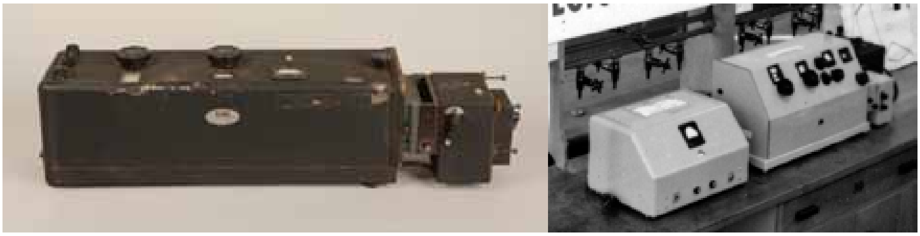
Curtis remembers that Barbour used to make ground glass joints when needed. Two '*Laboratory Assistants*' appeared in 1953 with names of D.L. Caldwell and R.M.L. Whitlock; they were employed for a two year period (see Appendix II). In 1956, R. Tregurtha, who also stayed for two years, was appointed a chemistry technician. Nevertheless, it was Bob Barbour's appointment that set the scene for a permanent professional technical staff whose numbers began to increase from the early 1950s, with a move to ally some to specific staff members for designated duties coming before the end of the decade.

John Burgess, 1978
(courtesy of I. Burgess)

With the construction of the Easterfield Building in 1956, Prof. Slater was able to appoint other technicians and Research Fellow Bill Martin (associated with Bobbie Monro as noted earlier) gained one of the early laboratory assistants, Anwyn Long, for his ironsands work in the Hunter Building during the mid-late 1950s. The most notable appointee was Londoner John Burgess, the *Laboratory Steward*. John came from a position in the steel industry research laboratory in Sheffield, the successful applicant from close on fifty. With his wife Jean and family they emigrated under an assisted passage arriving in 1957. John had much to do with the move of Chemistry into the new facilities and in getting things straight. In the early days of the Easterfield building all the volatile organic solvents came in standard Winchesters. However, costs soon dictated that delivery was in 44 gallon drums. The solvent store was isolated and at the back of the chemicals storeroom. It was here, with no ventilation, that the Winchesters were then routinely filled from the drums. Two incidents involving this activity have come to light. In the earliest days, Mr Brierely was directed to restock Winchesters with diethyl ether, which he did in the enclosed Solvent Store. The situation became of concern when he almost anaesthetized himself but he did get out in time. The second was more serious and is described in detail in Chapter 9.

Instruments and Technicians

It was Slater who saw to it that the new Easterfield laboratories were equipped. There were the (then) traditional swing-type beam balances, Wheatstone bridges, thermostat baths, and routine glassware, corks and bungs, and Slater had a rather primitive ozonizer that came with him from Dunedin. However, much of the physical chemistry equipment was handmade by Arch Matheson. Microanalyses were carried out as part of the service offered by the Otago University College as aptly described by Prof. Arthur Campbell in 2011 when the unit was in its 75th year.[21] The first instrument for spectral recording appears to have been a Beckman Instru-



Left: Beckman DU UV-visible spectrophotometer and power supply, courtesy of Chemical Heritage Foundation Collections, Photograph by Gregory Tobias. Right: the later Unicam SP 500 UV spectrophotometer (from the Victoria S 19 photo of the 1959 *Conversazione*).

ments DU manual single beam ultraviolet-visible absorption spectrophotometer, but it is not known when it came into service. By 1959 it had been replaced by the Unicam SP 500 shown above, also a manual single beam instrument, and obtained by Basil Johns, a member of the academic staff for four years from 1955. It was on display at the 1959 *Conversazione* (see p.38). Johns also had an old polarimeter (of the manual type) that he used and which was still in use in chemistry through much of this author's academic tenure.

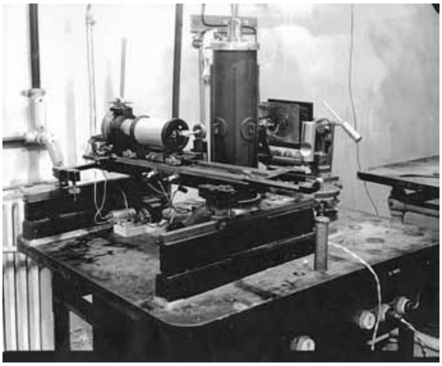
Upper: A Perkin Elmer PE 21 IR spectrophotometer. ©2012 PerkinElmer, Inc. All rights reserved. Printed with permission. Lower: The VUW Shimadzu UV-160 recording spectrophotometer in use in 2012, SCPS photo

Arch Matheson obtained a single beam Hilger Watts UV-vis spectrograph that remained in his office for his use. Alex Wilson, the former student of Slater who had had some picritoxin work published in 1951, joined the staff in 1960 ostensibly to teach an applied chemistry course. He was asked to get air-conditioning installed in a lab in the north-eastern sector of Level 1 so that the 'new' Perkin-Elmer infrared (IR) spectrophotometer, a PE 21 dual beam instrument, could be brought to a reliable running standard. This instrument, of the type shown above left, carried a large horizontal rotating drum recorder but it sat uninstalled for several months before the room was ready for use. Samples were run predominantly as nujol or HCBD mulls by the first instrument technician, Russell Woods, from 1962. By this time, the University Grants Research Committee was established un-

der Hugh Parton, the inaugural chairman, and the funding for this infrared instrument came from that source. Over the years, the IR and UV instruments were progressively up-dated dependent upon finances and the state of the existing instrument. Thus, the IR moved forward to a Grubb Parsons C58, and then from a Perkin Elmer 330 to a table-top recording Unicam SP 200 that survived for many years into the 1980s. The first automatic recording UV instrument was a Unicam with an industrial grade chart recorder. A Shimadzu UV 160, still in use in the Synthesis Laboratory even today (September 2012) came in the early 1980s.

As science evolved and Fourier transform (FT) instruments developed, Gary Burns pushed for FTIR facilities at Victoria. Ultimately, shortly before the demise of the UGC, a large grant to equip each university was made available. Neil Curtis negotiated the entire package with high resolution Digilab instruments being installed throughout NZ in 1990. Each instrument had an air-bearing drive that needed continuous dry nitrogen, and hence a cryogenic tank of liquefied gas. Instrument control was from a dedicated computer operating UNIX software.

With Duncan's arrival in 1962, the Department saw the first of its more specialized instruments as he brought a Mössbauer spectrometer with him together with two PhD students, but no instrument technician – the instrument was run by those using this new-to-NZ spectroscopic technique. The newer system that came from the USAF monies he secured was also self-assembled from modular components and this remained the Departmental Mössbauer system until Jim Johnston acquired an Israeli Elscint recording instrument in about 1980. The electromagnet that had been added to the old system provided the means for magnetic susceptibility measurements up to the 1990s. The Elscint instrument was initially regarded as a failure as it refused to operate as it should. Nonetheless, Johnston's persistence and tenacity led to an Israeli technician being dispatched to Victoria and, given his expert tweaking, the new Mössbauer system met specifications and provided reliable service for many years.



Single-crystal X-ray equipment: left - Weissenberg camera; right - Buerger precession camera, reproduced with permission of the Geophysical Laboratory, Carnegie Institution of Washington, USA. *https://library.gl.ciw.edu/GLHistory/crystal.html*

Alan Freeman was one of the other 1960s appointees and a solid state inorganic chemist. He arrived in 1964 and had a major interest in X-ray diffraction to gain the structural information on the intercalation compounds that he studied. In 1967 he obtained a Philips PW 1010 X-Ray generator with Norius Weisenberg and precession cameras and a powder dif-

fraction diffractometer with its associated electronics and chart recorder. In about 1979 the system was upgraded to a new Philips X-Ray generator and automatic powder diffraction system. This was maintained by Alan until his death in 1985 and then by Jim Johnston and David Weatherburn to the late 20th century. By about 1973 the Department had obtained a stand-alone Siemens SRS X-ray Fluorescence Spectrometer (XRF) system and a Techtron 5 Atomic Absorption (AA) Spectrometer. These were housed as a part of the James Duncan-initiated Science Faculty Analytical Facility to which the participating departments made contributions for equipment upkeep. The XRF was upgraded to a Philips system in about 1985 and it remained in use well after the turn of the century, though with geology and not chemistry. One of the technical staff who worked in the facility (1976-1978), Manfred Schefer, sadly died in 1978 as a result of a (home-built) aircraft accident just a short time before his own aircraft was due to undergo its inaugural flight.

A year after Alan Freeman's arrival, E.P.A. (Ted) Sullivan joined the physical area in 1965 with his work at Victoria and elsewhere dominantly in the nuclear quadrupole area. Ted set up a system for Raman spectroscopy using a mercury lamp and a prism in conjunction with the simple IR facilities. But it was Gary Burns, a VUW graduate, inorganic spectroscopist and staff member from 1968, who introduced laser Raman spectroscopy to Victoria in the mid-1970s. He successfully built a set-up with separate gas lasers, monochromator and detector that worked well. However, the lasers were short-lived and very expensive to replace. The room that had housed the original IR instrument was redesigned for the laser such that accidental access to it was impossible when the laser was on. Despite its cost and the expectations that had led to its approval, the laser Raman never entered widespread or significant usage even though it was updated to Fourier Transform capability in 1985. This came via an $85,000 UGC grant and $40,000 from the internal research committee, but not just to Chemistry as Geology was also a significant player.

Left: The liquid air machine. Centre & Right: John Craig's HP Gas Chromatograph in routine use from the early 1980s-2012, SCPS photos.

More routine equipment such as the liquid air machine (late 1960s) and gas chromatographs, though never easy to fund, came into the Department. The initial analytical glc unit was replaced by an analytical/preparative Philips Pye Unicam system in the mid-1970s and Dr. John Craig obtained an updated Hewlett Packard instrument (shown opposite) in the early 1980s for his work on volatiles analyses. The physical chemists obtained specialized high pressure and temperature equipment following John Tomlinson's appointment, but here the costs were not high in comparison with the evolving spectroscopic techniques.

The post-war growth in student numbers in Chemistry meant a need for more adequately trained support staff. In this regard the Technicians' Certification Authority of New Zealand was established by government in 1958. It prescribed courses and syllabi, and conducted national examinations to provide qualified technicians for the gambit of NZ industry. The move to provide technical education in tertiary level institutions received a boost in 1956. Dr C. Beeby, the then Director-General of Education, noted worldwide trends that he thought NZ should follow and put forward a vision for tertiary technical institutions. It was largely adhered to over the ensuing thirty years. In particular, he envisaged a vocationally oriented teaching institute rather than one based on a substantial research role. The Wellington Polytechnic was established in 1962 and, over the years, it saw a good number of VUW technicians gain their professional qualification (and salary increment). It was Ted Harvey who had charge of the technician training and he became the interface for the general staff to the Administration. He ensured that the demands of the Technician Certification Authority were met and that every trainee technician spent the required period of time in each of the laboratory areas in the Department, thus gaining an ability to work in one area and provide trained backup in another, something that no longer exists. His role required interaction with Wellington Polytechnic (as it was then) and he became the VUW representative on its Council in 1971, serving until the end of 1988. The salary structure and promotion prospects for the specialist technical support staff member was not good in the university as one Technical Officer and/or Senior Technical Officer was regarded as adequate in each Department. For much of this period the technical trainees could, after completing the training process, move to positions external to the university that offered a better salary and career opportunities, and many did so after a short but respectable interval. Victoria University seemed to regard the provision of such technical training as a part of its community responsibility.

Thus it was that from the early part of the 1960s, the number of technicians (and academics) in chemistry increased. Slater proffered suggestions to the central administration for minor modifications to the Easterfield Building to cope with the increasing number of staff that needed office space. Much of this seemed to fall on deaf ears as staff and technicians continued to occupy the lecture prepara-

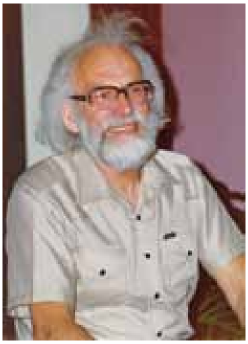
tion rooms and others spaces not designed for the purpose. A chemistry workshop had been created on the ground floor (EA 106). Initially, it was equipped with a press drill, vice and grindstone together with assorted tools. Neil Curtis was the academic in charge but within a year most of the screwdrivers, hammers and the like were missing. In 1963 the new position of '*Handyman*' was approved and the first workshop technician appointed, Greek Emanuel Haldezos. As Slater advised the then staff and research students early in 1963: '*With the growth in the number of technicians and academics, arrangements are summarised for the responsibilities of the technical staff*' and went on to specify them. At that time Bob Barbour was the glassblower, Ray Page took charge of the instruments and Russ Woods spent his time equally between the physical laboratory (that had Brian England in charge) and in providing an IR spectral service (under Neil Curtis's supervision). There is no record of other technicians or technical assistants (TAs) other than the (incomplete) listing collected in Appendix III. The Chemistry Department was only ever served by four *handymen*, Messrs. Saxon, James, MacLean (Mac) and Curtis. Mac, the longest serving appointee (1968-1976), used to make the morning coffee and afternoon tea in the small kitchen on the second floor of the Easterfield Building and then deliver the coffee, together with mail, to the academics in their offices in the mornings. His main value, however, was that he was capable of, and allowed to, replace tap washers and light bulbs, and service water aspirators and other small mechanical and electrical equipment. He retired in October 1976 and, sadly, died just three weeks later having rarely been off work sick. He was replaced by Ken Curtis but the services diminished and Ken was not replaced when he left in 1982.

Glassblowers Ian Crichton & Cliff Taylor, VUW-S19

In 1963, the Department boasted 28 stirrers of which 3 were on permanent assignment to the Stage III physical chemistry class.[20] A new Unicam SP 700 Vis-UV spectrophotometer arrived in September and, interestingly, the records show that the MSc Honours students were expected to have completed all their experimental work before December 7 that year, most likely because of the two week *School on Laboratory Instrumentation* held that month. The chemistry library on Level 2, always under the jurisdiction of the university librarian, came into disrepute. It appears that some academics had allowed graduate students to use their own staff key for access outside the normal working hours of 9-5, Monday to Friday, and a memorandum to staff from Slater was forthright in reiterating the library policy of no access for any student (even PhD) outside normal hours! There were some 464

students enrolled in Chemistry that year (336 at Stage I, 90 at Stage II, and 38 at Stage III) and 470 the following year.

By about 1965, Bob Barbour, the glassblower was also store manager and became the Senior Technician (ST), a role that he held until his departure at the end of 1969. He went with Wilson and Carr to establish science at the new Waikato University. By 1965, Slater had built the technician numbers up to eight and he appears to have used the system at University College (London) as a model, the documentation of which Brian England had brought back with him from sabbatical leave. The eight included Barbour, Burgess and Page. Ray Page was appointed Technical Officer and took over the Senior Technician role from Barbour for one year until his own departure in 1970, when John Burgess stepped in and held the role until he was appointed to the Teaching Aids Facility in 1978. Of the remaining five, George A. Holley had arrived the previous year and was assisted by P. Voelk. George continued at Victoria as the senior biochemistry technician until 2000 when restructuring in science forced him out of the institution and into partial retirement. He now runs *Skulls Down Under* utilizing his talents to provide skeletal/individual bone preparations for museums and the like. Russell Woods, the original IR technician retired that year. In contrast, Eric Stevens ran the first-year laboratory until 1968 when he moved into the inorganic area, remaining there until his retirement to Carterton at the end of 1983. Eric was a more than competent artist and donated his watercolour *Tauranga-Taupo* to the Department. It now hangs in the School Office on Level 1 of the Laby Building. His artistic abilities were used to the full as he became responsible for all of the chemical structure drawings and illustrations in the Department, a task that subsequently moved to others and finally Teresa Gen, who mastered the art in the electronic era of the 1990s. In that 1965 year there was one other technician, an A.F. Mess and one technical assistant, A.E. Jame.



Eric Stevens, ca. 1982
VUW-S19

John Burgess was an adept individual whose role was to provide the lecture demonstrations from his office adjacent to Easterfield 006 as well has having responsibility for the laboratories. Initially, *live* chemistry demonstrations were given during lectures, something that James Duncan was especially keen on, and was common to chemistry teaching from the earliest times. However, safety regulations now prevent all but the simplest experiments. There are two noteworthy outcomes of the Burgess era at Victoria. The first was in his providing the original university-wide course on 16 mm film projection in 1969 that was so popular it was repeated to some 20 more individuals in 1970. The second was his production of the first Safety Handbook in chemistry, termed *Laboratory Hazards*, that

appeared in the late 1960s. This was reprinted in 1972 due to its widespread fame and on-going requests for copies. It was superceded only in 1977 with the production of a university-wide '*Safety Handbook*' that was produced by the then existing Safety and Civil Defence Advisory Committee under chemist Brian Halton. As the years of the John Burgess era passed, he moved more and more to slide and audio-visual materials and became the Senior Technical Officer in the *Teaching Aids Facility* upon its inauguration.

John & Jean Burgess with Ross Inkster (rear) 1983 (courtesy of Ian Burgess)

In the late 1960s the number of technical staff had almost doubled and they, with the secretaries, the workshop personnel and stores staff rapidly became the backbone of the Department. By then, the number of first-year students was approaching 400 and that of the technicians close on fourteen. As time passed it became essential to have one of the technical staff supervise and take charge of a given teaching laboratory. Their role was, in essence, simple enough but the reality was not always the case. Each was required to have the facility ready for the undergraduate students to enter and perform the necessary experimental work whenever a session was scheduled, be it inorganic, organic, physical, or the more general first-year studies. This demanded a range of skills from assisting in the development of new experiments to performing the experiments prior to the course to ensure all were 'manageable' – what an experienced staff researcher could do in two hours did not necessarily mean that an undergraduate would achieve the same even in four hours. Good record keeping was also essential as, until the mid-1980s, students in inorganic and organic at the second- and third-year levels were allocated lockers and had their own equipment they were responsible for. Breakages had to be paid for from a laboratory deposit (or a further demand). All of the necessary chemicals, solutions and supplies had to be available and, as there was never an excess of funding available, caution and stringency were needed, while at the same time the students had to be able to make excellent progress. The provision of appropriately diluted (or concentrated) solutions and the vital 'standards' for volumetric analysis were routine. As time passed, the late 1970s and 1980s saw the 'Technician-in-Charge' taking on the

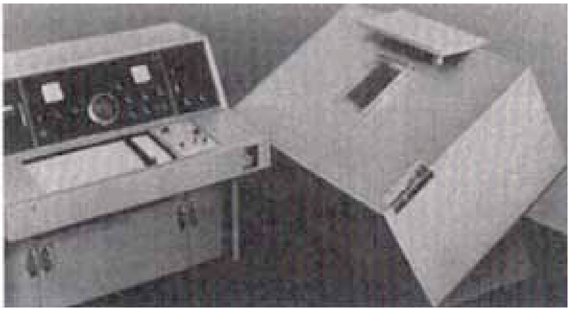
responsibility of keeping the lab finances in the black – not the red – and being everything to everyone.

The First-Year laboratory for introductory chemistry was run by Eddie Hollingsworth for several years until about 1973 prior to his move to a support role in the chemicals store. He was always a dishevelled well-meaning individual whose laboratory prowess deteriorated in line with his sight, and was, perhaps, fortunate to keep his position for as long as he did. He was replaced by Jean Burgess, John's wife, who retained the role for almost ten years. The Physical Chemistry area under John Tomlinson gained R.J. (Ray) Page and then Cliff Snell, who moved to the Joint Mineral Sciences Research Laboratory when that opened in the Cotton Building; Dr. Gordon Bird was also with him there. Mr. E. (Ted) Witterick, and then Laurie Morton, followed Cliff in the physical arena. Jean Burgess took charge of the Radiochemical Laboratory and subsequently looked after this and assisted in the First-Year lab before taking on the latter full-time. She retired with her husband John in 1983. A list of the staff in chemistry is provided in Appendices I-III and, while the academic personnel are complete those of the technical and secretarial employees is merely a 'best available' from various archival records and many personal communications.

From the earliest days and throughout the lifetime of the Chemistry Department, research work carried out by the academic staff was aided by the presence of research assistants, demonstrators and technicians. The ability of the technician to assist with research was regarded by many of them as the 'icing on the cake', especially as they were able to spend much of the long summer vacation working with one of the academics on a specific research project and being included among the authorship of any subsequent research publication. In general, this continued until chemistry merged with physics and the advent of 'outreach' work that spanned most of the university non-teaching periods. This demanded much more routine laboratory maintenance. The technical assistant never spent more than one summer with the same academic and the time benefitted both the academic, whose research project moved ahead more rapidly, and the technician, whose ability was recognized and whose skill base expanded. In the organic area, this type of experience subsequently led to Regine Blattner and Rhys Batchelor successfully undertaking part-time PhD training and moving into professional posts beyond the university upon graduation.

In June 1962 the Dominion Laboratory acquired a state-of-the-art Varian DP-60 NMR instrument. It operated at 60 MHz, having a permanent electromagnet that developed 1.4 T and weighed one ton. It provided routine proton NMR spectra. The then Director of the Laboratory wrote to Prof. Slater to advise him of this and offer a service to the VUC chemists *until the Auckland University instrument became available*. There are no records to show how frequently the offer

was taken up or whether samples were ever sent to Auckland, but by 1967 it was clear that Victoria needed its own instrument. Ted Harvey gained the support of Slater and the organic chemists for a spectrometer and approaches to the UGC Research Committee were successful over 1967-1968. The choice was for a Japanese Hitachi Perkin-Elmer R20 recording 60 MHz proton NMR instrument. This was state-of-the-art instrumentation at the time of its acquisition, and an equivalent to the well-known Varian T-60. After its arrival and set-up on the ground floor of the Easterfield Building, it provided almost continuous service until it was decommissioned in 1981. The first recognized organic chemistry technician was, it is thought, Colin Bleasdale, who saw the transition into serious instrumentation in chemical research at Victoria. He joined the staff in late 1967 and was trained to operate the NMR by Ted Harvey. Colin left in 1972 to pursue a career in teaching in Porirua (that has been successful). During his time he rapidly became the service provider for most of the organic staff and students until he left. His place was taken by Regine Blattner whose part-time PhD degree was completed in 1982 and she moved to DSIR Chemistry Division. Steven Milgate then joined the organic chemists and had the duty of running and maintaining the organic teaching laboratory as well as providing NMR service, but the NMR took up more and more of his time as the years passed. The new organic man and author of this account, Brian Halton, arrived at almost the same time as the first NMR. He had had experience in running both a Varian T-60 NMR and a Hitachi Perkin-Elmer RMU-6E mass spectrometer in the US, and so he, too, was licensed to run and assist in the maintenance of the Hitachi machine, taking over Harvey's role when he moved to the full-time Registrarship.



An Hitachi-Perkin Elmer R20 NMR reprinted with permission from the *Paint Testing Manual – Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors (STP 500),* copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA, 19428

The era of costly scientific equipment that began in the mid-late 1960s generally was served well by the UGC Research Committee which, it might be noted, had more than one chemist in the convener role. Where the system failed at Victoria, and elsewhere, was in the provision of subsequent technical support. For far too long, the presence of an instrument was deemed to support the research of one or two academic staff and the maintenance of that equipment and its daily operation was regarded as an added duty. The use of the NMR instrument focussed matters

because routine spectra from all of the organic and several of the inorganic research groups was something that could not be met by an academic within normal duties. Nor could the detailed electronic circuitry be understood and maintained by the customary electrical (electronics) technician, in sequence Colin Heath, Laurie Morton and Douglas Flux onwards, from the early 1980s. Thus, it was the NMR instrument that drove the need for an instrument operator and it was the organic technician that took on this role as well as servicing the needs of the teaching laboratory in the area. Despite this, it was the academics that spent many long evenings with the R20 electromagnet unit, manually tuning the instrument – and on more than one occasion the bang of a door made the hand jump, requiring the operator to start tuning over again.

The Hitachi-Perkin Elmer instrument served Chemistry well. It had a serious malfunction in late 1978 and, with the nearest technician being in Japan, communication was with the Hitachi office. There were major language difficulties that were solved only in 1979 with the generous assistance of Prof. Koji Nakanishi of Columbia University (New York) who Halton had met at an early 1979 conference. By this time the advances in electronics, instrumentation and magnet systems provided an ability to gain not simply proton but also carbon NMR spectra. The era of the R20 had drawn to a close and second generation NMR instruments were available in the US and Europe. And so it was that Ted Harvey championed the cause for a superior instrument, a Fourier Transform, water cooled electromagnet system that operated at 80 MHz for proton and 20 MHz for carbon spectral recording. The instrument of choice, following many hours of detailed negotiation with Watson-Victor, the then major instrument company operating in NZ, was a Varian FT 80A. It arrived after Ted Harvey had left chemistry for the central administration, becoming the University Registrar. Thus, it was Brian Halton who took charge of the new machine and had it installed in the same Easterfield room, but with a permanent water supply to cool the magnet and maintain optimal temperature. When the need for cooling water was pointed out to the administrators of the time – formally Minor Works but *Works and Jerks* or *Minor Miracles* were the vernacular options – there was no interest in recycling the warm water. It would make for a fascinating calculation to see just what the power and water costs for that instrument were over its more than

Brian Halton at the FT 80A with Alan Ross (from VicNews, 1980)

twenty-five years of operational life.

The presence of an FT 80 instrument in DSIR's Chemistry Division had a major influence on the Victoria choice. The presence of two equivalent instruments 19 km apart made for an easier diagnosis of a problem when one occurred; hence, the Varian FT 80A choice. Subsequently, circuit boards were taken from one instrument to the other whenever necessary to see if they were the source of a problem. The installation technician was Varian's senior man from Palo Alto. He used the time also to train Alan Ross, who became Varian's NZ electronics expert. Although there was never a formal service contract to use Alan's expertise, joint visits to Victoria and DSIR minimized costs and were made reasonably regularly. Over the years, it was Alan's persistence and good nature that kept the instrument in working order, and this despite a fire in the nearby Chemicals Store in 1985 giving smoke damage, and a major flood in 1988 that was caused by rupture of the main riser on the top floor of the building. The Varian FT 80A served the needs of the organic chemists well into the 1990s largely because the DSIR instrument was, at Halton's behest, transferred to VUW for subsequent use as a source of replacement circuitry and other parts when it was replaced. However, by 1990 it was obvious that the advances in technology and instrumentation would dictate a superconducting instrument should serious chemical research continue. In fact, Victoria made a contribution to a DSIR–Chemistry Varian Unity 500 MHz instrument that was installed in 1993 and was given limited access rights. However, this became inadequate and the aged FT 80A was replaced with a Varian 300 MHz superconducting facility in late 1996.

The VUW Rayonet RPR204 Photoreactor in 2011, SCPS photo

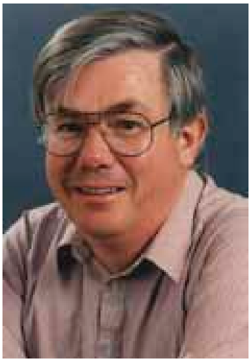
The organic chemists, Halton and Ferrier, were, in turn, each allocated a sum of money for equipment set-up after arrival, and each added a new piece of equipment to the area. Halton was given \$500, the equivalent of today's set-up grant, which was used to purchase a semi-preparative Rayonet RPR 204 photochemical reactor from the Southern New England Ultraviolet Co. for his studies. It operated at 254, 305 and 350 nm and remained operational for some 40 years. In contrast, Robin Ferrier had a need for fast and accurate measurement of the optical rotation of the carbohydrate chemicals that he was studying. Thus, he was funded for a recording instrument, which also gave many years of service and replaced Johns' 1950s model. The next major spectroscopic item was a mass spectrometer. The department had a home built low mass-to-charge ratio instrument (*m/z* <100) that served for some early isotope ratio studies, but it was of little use for recording

molecular masses of the molecules synthesized by the organic chemists. Thus, it was in 1973 that Ted Harvey mounted a campaign for a state-of-the-art mass spectrometer with a mass-to-charge range into the hundreds largely for use in organic structure analysis. His efforts secured the approval of the Department for an instrument to be placed within the faculty Analytical Facility, and in late 1974 an order was placed for a Micromass Instruments 12F low resolution instrument.

Brian Halton spent a week at the Micromass facility in Manchester while on sabbatical leave in 1975 and the instrument arrived in the second half of that year. Because it was a double focussing instrument of the second generation type it had magnetic and electric sector focussing. Its size was enormous by comparison with 21st century instruments. The machine, with its associated large vacuum pumps and curved arc tube was housed separately in a room of the Maclaurin Lecture Block that transformed into the mail room in the early 21st century. Operation was not simple and the instrument was nurtured by Ted Harvey, who recorded most of the routine samples himself. Brian Halton assisted to a small extent, but mainly provided spectra for his own students. Initially, there was no technician allocated to this instrument, but with Harvey's part-time and then full departure to the university administration in the 1978-79 period, Miss Christine Chapman became a trained operator and ran the instrument additional to her other duties, until it was decommissioned in late 1984.

The era of the Micromass 12F was brought to a close by it becoming obsolete once miniaturization in the electronics industry led to the desktop mass spectrometer of which the Hewlett Packard is the prime example. The decommissioning of the Micromass instrument was accelerated following an approach to the Chemistry Department by the NZ Racing Conference, the monitor of racehorses for the presence of possible performance-enhancing substances. The organization wanted to have a NZ-based testing facility but had an insufficient workload to justify its own laboratory. The outcome was the placement of a low resolution Hewlett Packard 5995C instrument in Chemistry that the Conference-contracted technician ran for all the horse urine samples. This was at no cost to the Department and the arrangements initially had Geoff Beresford provide their service until his subsequent move to a new facility in Auckland; Murray Friar then took over for a number of years. The time used for the horse testing work was little more than one day per week and the instrument was available for departmental use for the rest of the time. By then, Dr. John Craig had become more interested in volatiles chemistry, especially from wines, and he ran the MS for the chemistry needs until his retirement in January 1991. The instrument continued to give service until mid-1998 with Michael France, one of the electronics technicians, providing a service for researchers until his departure. The replacement was a Perceptive Biosystems Mariner instrument, which operated under atmospheric pressure chemical ionization

(APCI) and electrospray injection (ESI) modes. Importantly, it had accurate mass measurement and it came in 1998 to what had become the School of Chemical and Physical Sciences in 1997. Its purchase was coupled with a MALDI instrument for the Biological Sciences but, unlike the 'supercon' NMR, the MS package was a charge on the Science Faculty leaving no funds for other equipment purchases for more than a year.


David Weatherburn
VUW-S19

David Weatherburn joined the academic staff as a lecturer in the inorganic area in 1973. His interests were in co-ordination and bioinorganic chemistry. He gained funding for a stopped-flow spectrophotometer a few years after his arrival, purchasing an Applied Photophysics instrument from the UK. The decision was forced by cost as his preference was for the more expensive US instrument. By then, the mid-1970s, the expansion of science was over, student numbers had begun to decline, and monies for chemistry from the UGC Research Committee were becoming more difficult to obtain. Thus, the arrival of David's stopped flow instrument and the organic mass spectrometer marked the end of an expansion era, not simply with equipment but in academic and technician appointments (Jim Johnston and Robin Speedy were here by then). After 1976, no new academic was appointed until 1991, and those technicians who retired or left, at best, were replaced. The secretarial pool, however, grew to provide the needed assistance for the Chairperson of Department when the system changed from its autocratic model of Head to the supposedly democratic Chairperson in 1981.

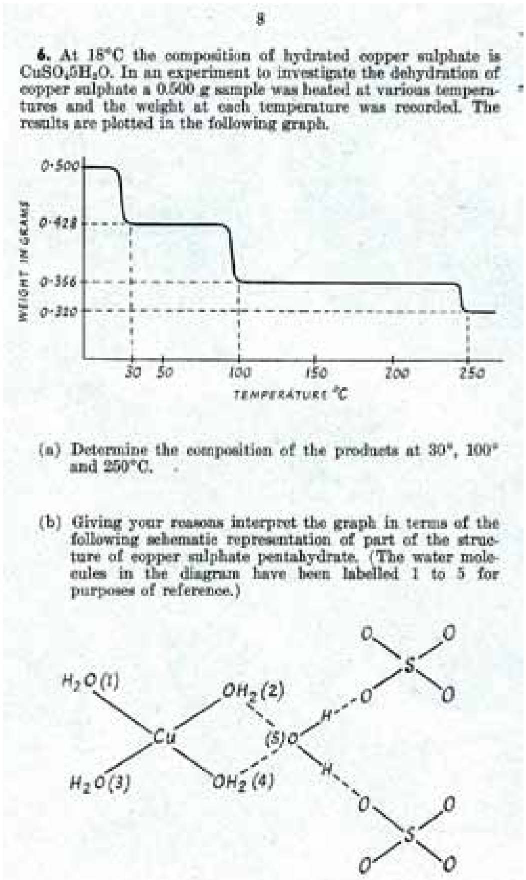
Secretaries

It is not clear just when the Professor of Chemistry gained the first secretary, but Prof. Slater had Patricia Barr (sister to Ted Harvey's wife) as his secretary over 1951-1953. She was followed, either directly or later, by Alison Malone who left in 1957. Mrs. Rita Watts came in 1958 and was replaced by Miss Unity Jones in the early 1960s; Unity remained the Head of Department secretary until after Slater moved full-time to the administration in 1969. With the appointment of James Duncan to the inorganic chair, a second secretary joined the Department [thought to be Dawn (family name unknown), who was


Rhyl Singleton at home in the early 1970s (courtesy of Dick Singleton)

also a part-time professional singer and performed throughout the country] and, thereafter, each newly appointed professor was accorded a secretary. As time passed these ladies served the needs of the sub-discipline in which they were employed and not just the professor. The job description recognised this from about 1980. However, during the era of a single departmental secretary, the sub-professorial staff simply had to wait until there was time to squeeze in the typing of a manuscript for publication, something that Neil Curtis remembers well.

In general, the secretary to the Head of Department completed all the departmental committee minute recording and preparation, and this included any faculty committee or sub-committee work that the Head did, together with his correspondence and much of the work associated with the laboratory manuals. Until there was a professor in each of the three sub-disciplines, the academic staff had to fend for themselves for secretarial services for much of the time. However, by the very early 1970s, with the demands of the undergraduate laboratory programmes and the need for 'modern' laboratory manuals, the 'area secretary' became the one who prepared the document. This was done from 'masters' manually typed for Gestetner reproduction (a messy gel-like procedure for transferring the typed word from a master to paper that had many a secretary spend much time getting her hands clean again). The master was loaded onto a drum that was manually rotated, once for each copy. The production of a first-year laboratory manual was no simple task! The typing of scientific manuscripts for publication was also a part of the duties and this required making two carbon copies with all corrections being attended to by hand until the use of white-out tape emerged. Staff members' lecture notes were all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6. At 18°C the composition of hydrated copper sulphate is $CuSO_4 5H_2O$. In an experiment to investigate the dehydration of copper sulphate a 0.500 g sample was heated at various temperatures and the weight at each temperature was recorded. The results are plotted in the following graph.

(a) Determine the composition of the products at 30°, 100° and 250°C.

(b) Giving your reasons interpret the graph in terms of the following schematic representation of part of the structure of copper sulphate pentahydrate. (The water molecules in the diagram have been labelled 1 to 5 for purposes of reference.)

Entrance Board Scholarship Paper, 1972, VUW-S19

personally hand written, but the annual Victoria examinations were typed by the secretaries with the academics inserting all diagrammatic material prior to dispatch by the University to Whitcombe and Tombs (the precursor to the 21st century Whitcoulls) for printing: it had its own printing division. A page from the 1972 national school chemistry scholarship paper serves as an appropriate example. As time passed the templates used for structure drawing were superseded by rub-on transfers and the technical staff, initially Eric Stevens, later Isabella Pomer and then Teresa Gen, provided a drawing service. Teresa evolved this to the electronic medium following the advent of the personal computer and the availability of drawing programmes for chemistry.

It is interesting to note that the subdivisions of the discipline were served by remarkably few of these highly professional secretaries who evolved their careers with the Department. Rhyl Singleton left for more than ten years from the mid-1960s to raise a family, but she maintained contact with the Department by typing theses and staff manuscripts from home. However, from the early 1970s the Head had a fair turnover of these ladies from the demands placed upon them. Prof. Duncan had a raft of short term appointees over this period until Rhyl returned in 1977 to remain until her retirement in 2002. For some of her early time in this re-employment period she worked half time in each of Chemistry and Earth Sciences. John Tomlinson and physical chemistry were served by Mrs. Celia Mitchell, Mrs. Margaret Povey and then Mrs. Jenny Hall (from 1987-2007), while Ferrier and Organic Chemistry were served by Mrs. Jean Moohan, Mrs. Ann Beattie (from the mid-1970s to 1988), Mrs. Jannie Brown, and Mrs. Alison Hetherington together with a few who stayed only for short periods. Of those within organic, it was Ann Beattie who stayed for the longest time. As a fellow Scot, she was able to juggle the demands of Prof. Ferrier with the needs of the other organic chemists and also provide the essential documents for the teaching in the area.

After the electric golf-ball typewriter had become sufficiently common, it was introduced to the university departments, initially in 1972 to the Head's secretary and then, later, to the other professorial areas. This was an order of magnitude advance as four distinct interchangeable golf balls were available thereby enabling a mix of fonts to be used. Indeed, the then Head's secretary, Carol Mason, sent an invitation typed in italic font to the Stores' Manager, Peter Lees, to attend an appropriate function! The manual machines that they replaced were then made available for use by those academic staff who so wanted. Some of the academic staff were even allowed to use the new golf-ball electric typewriters out of normal work hours by certain of the secretaries. With the Gestetner giving way to

Peter Lees (Leighs)
VUW-S19

the photocopier, the lot of the secretary became much easier save for the increased secondary workload that such easy reproduction gave. But it was the advent of the personal computer (PC) and its provision, initially to the secretarial staff and then, later, to the academics, that forever changed the role of the secretary. For many of the more senior university academics, the idea of performing *secretary's duties* was abhorrent and they had little interest in *owning* a desktop machine. However, by the mid-1990s most academics had become modest typists, even with only two fingers; a PC was located on every academic's desk. The provision of appropriate work-stations came much later, but only after many cases of occupational overuse syndrome (OOS as it was then designated) and the efforts of an effective occupational health nurse. The personal computer eroded the role of the secretary and, as the years passed, what some academics had done for convenience became a requirement placed upon them – but without any time allocation for it. From 1996, the humble secretary disappeared to re-emerge as an *Administrative Assistant*, then an *Administration Assistant* in 1997; *Managers* abounded. Because many of the academics had chosen to attend to all their own electronic communications, generate their course lab manuals and prepare their own manuscripts for publication, the era of a traditional secretary was all but over. Despite the highly specialized nature of much scientific software and the continuing need for a dedicated service, the academic environment shifted to one in which competence at the keyboard was assumed for all, irrespective of training. Rhyl Singleton left in 2002 (and died in 2007) to be followed in 2007 by Jenny Hall. They were the last of the true University Chemistry secretaries at Victoria. Now, few of the recent administration assistants are familiar with the specialist software in use in the School of Chemical and Physical Sciences and Jenny Hall has had to be recalled from time to time to cope with some of the intricate demands of physicists' publication works.

Joan Taylor, Rhyl Singleton, Jenny Hall, and Alison Hetherington, VUW-S19 photos

Chapter Seven

Growth in Research, Decline in Numbers

The increase in academic staff numbers through the 1950s and 1960s largely was to service the increasing cohort of undergraduates. The number of first year chemistry students was about 200 in 1955 rising by 50 the following year and sat at 276 in 1960. Another 65 or so took the 2nd-year organic course. The number reached a maximum in 1965 – 421, with 80 2nd-year candidates and 35 at 3rd-year level, a total of 536! There were a further 12 Honours and 18 PhD candidates, with biochemistry claiming four of the Honours and three the PhD enrolees.[20] By comparison with the early 21st century, teaching duties were onerous. When housed in the west wing, lectures were given in a small room that held no more than 50 students. This necessitated three lecture streams for the first-year course and sometimes all three lectures were given by the same lecturer, sometimes not. On Fridays, however, the class used the large theatre, C3. More often than not the second-year class fitted to the smaller room. Each year of the degree course had four lectures per week throughout the twenty-six week teaching year and first-year intermediate students made up more than one-third of the first-year intake.

Once in Easterfield with its larger EA006, the first-year lectures were delivered twice each day (noon and 4 pm) by the same lecturer. All first-year students had five hours of laboratory work each week divided over two equal sessions. At second-year, fewer subjects were studied but the laboratory component increased to 2 x 3 hour sessions, and then again at third-year to three sessions each of 3 hours.

Every laboratory session was supervised by a permanent academic staff member who was assisted by demonstrators at the first-year, but rarely by more than one at the higher levels until well into the 1970s. The design of the experiments, the provision of a laboratory manual and the grading of student work was a normal part the academic's job, but without graduate student assistance and the modern means of preparation and document reproduction. Little time was available for personal research. The need for biochemistry to run its laboratory programme in the evenings has been mentioned already and came about simply because the organic lab, the only one to which it had access, was in use every afternoon bar Wednesday; 2nd and 3rd year lectures were held in the morning between 9.00 am and 1.00 pm. The number of first-year students varied but remained close to 400, comprised some 404 candidates in 1971, but dropped progressively thereafter due to the change to course structure that was imposed from 1972.

Despite the instigation of the PhD degree in 1946, it took several years before the idea of NZ-based study became widely accepted. The tradition of gaining an '*English PhD*' was hard to shake off, especially as the fledgling NZ degree was regarded with some suspicion: *Where is the recognition and kudos?* seems to have been the common call. A number of this country's noted chemists who retired in the 1990s, gained a '*local PhD*' before travelling to England to study for a second such qualification in the mother country; examples here are Con Cambie and Brian Davis of Auckland University. Thus, it took some time before the quality and standard of the New Zealand degree was accepted, and at Victoria College, the first chemistry PhD was not granted until 1954 (Melhuish, supervised by Metcalf – see Appendix VI). The next two were Prof. Slater's students in 1958 and these were followed by a four-year gap until Basil Johns' sole candidate, David Ward (see Appendices V and VI). His 1962 submission marked the beginning of consistent PhD graduate study in the Department, with only the years of 1970, 1986, 1991 and 1992 gaining no PhD thesis submissions; of course, multiple submissions were made in many of the years (Appendix VI).

It was the early part of the 1960s that saw a dramatic increase in PhD registrations with 1954-1969 seeing some thirty PhD degrees awarded. Of these, Wilson and Duncan had supervised nine and six students, respectively. Hay and Curtis each mentored three students over the same time period. Brian England had looked after two students prior to his untimely death and had no PhD candidates at that time. Biochemistry's first PhD students worked with Prof. John Smith, but there were only two submissions prior to the area achieving departmental status in 1969. Duncan brought Harold Whitfield with him from Melbourne, and Mok Fun, the Malaysian Columbo Plan student, joined him. Of the other twenty-eight PhD candidates pre-1970, twenty-seven were young NZ men, with Gary Hook being the first Maori student in biochemistry (with Smith; 1968). The first and only female

PhD candidate in chemistry (or biochemistry) over this time was Jacqueline Ann Hemmingson who studied with Alex Wilson, submitting her thesis in 1968 (Appendix VI).

Although these PhD numbers were large in comparison with those over the 1970-1999 period, it needs to be noted that there were some fifteen academic staff in the Department with research emphasis going to the inorganic area with its new Professor. Research was always subservient to teaching and, for many staff, simply supervising the allocated honours research students was all that they had the time to do. The Robertson legacy that regarded the 'Honours' year as a normal advancement for the professional chemist continued well into the 1990s, but it became less popular with the early 21st-century government edict that the BSc Honours is not a research degree; many of Victoria's chemists must have turned in their graves! The research output of several of the long-standing staff members such as John Craig (1962-1990), Ted Harvey (1953-1979) and Alan Taylor (1968-1981) was generated dominantly by Honours students, though each did their own bench work when able. Despite minimal assistance, John Craig built a notable reputation as a polycyclic aromatic chemist prior to his move to use mass spectrometry to aid the detection of wine aromas for the last ten or so years of his tenure. A number of other staff had their area recognised later in their careers. Thus, the late Alan Freeman supervised just three (one jointly) PhD students in the sixteen years after his 1964 arrival prior to his untimely death in 1985 (1968, 1975 and 1980 submissions). However, he did supervise John P. Larkindale for his MSc degree in 1968, notable because John gained an 1851 Science Scholarship for PhD study in the UK in 1969, the last Victoria chemist to do so in the 20th century. At the time that Alan died (24 October 1985) he was supervising a further four students. Given the nature of the Chemistry Department, these unfortunate students were immediately nurtured by other staff, and each had a subsequent successful thesis submission from their jointly supervised studies. Alan Taylor gained publicity for his geochemical efforts, noticeably in the supposed production of gemstones that gained a *Dominion* newspaper item and the day's sales flyer in June 1969. He continued with this theme for several years but the successes were not great. Gary Burns, who joined the staff in early 1968, gained his first PhD student only in about 1983 and she was followed by a further nine in the 1985-

Alan Freeman, ca. 1973
VUW-S19

Gary Burns, ca. 1990
VUW-S19

1996 period prior to his early retirement in 2000.

The decline in science numbers through the 1970s saw the new PhD student registrations in chemistry fall to little more than two or three per year and remain relatively static at about four from the early 1980s. The numbers never approached those of the swinging sixties or those that the MacDiarmid Institute and Chemistry (as a component of School of Chemical and Physical Sciences) attracted over the 2005-2012 period. Despite the small numbers, the research output of the Department, as judged by staff publications (see Appendix XI) increased from the late 1960s with Curtis, Duncan, Ferrier, Halton, Smedley, Speedy, and Weatherburn making notable contributions.

The paucity of PhD students over the last quarter of Chemistry's first century stemmed, in part, from the number of UGC postgraduate scholarships available each year (a maximum of 100), and the fact that many appropriately qualified Upper Second Class Honours graduates were unable to gain funding for further study. This was much more severely impacted upon when the UGC awards were terminated with the disestablishment of the Universities Grants Committee in June of 1990. Each institution was then required to provide for its own postgraduate students. Victoria University in general and the Chemistry Department in particular, were never well endowed during their 100+ years of existence. The establishment of Victoria as '*a people's university*' aptly describes the way in which its chemistry alumni have supported their *alma mater*. For Chemistry there has been only one significant donor, namely Gerry Gordon, a Wellingtonian, who studied for his MSc degree (Thesis: *Some cyclic tetramine complexes)* under Neil Curtis, graduating in 1964. Gordon moved into the concrete additives industry in the US, becoming the President of Boral Material Technologies Inc. in San Antonio, Texas. In 1997 he donated $1 million to Victoria by way of the Curtis-Gordon Research Scholarships in Chemistry that were established in August of that year and which were, in their early years, responsible for the survival of research in the discipline. The inaugural 1997 recipients were Nigel Burt and Lyndon West, students with Burns and Northcote, respectively. These

Left: Gerry Gordon & Neil Curtis with their 1998 Scholarship recipients.
Right: Gerry at home, VUW-S19

awards were made prior to completion of the formalities for the fund and, later the same year, Deborah Traynor, Monique Cull, Nicola Morgan, Carissa Jones and Chaohong Shen were named the recipients for 1998 (shown in order down the stairway) at the time when Gerry Gordon visited and inaugurated the fund.

Physical Chemistry Research

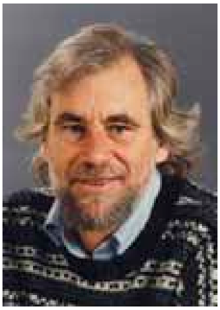
With professors present in each of inorganic, organic and physical chemistry from the 1971 academic year, one could rightly expect each of these areas to evolve a strength and research reputation. Sadly, this did not happen, as much as anything because Victoria had maintained its traditional strength in teaching, with academic appointments largely focussed to provide for a rounded undergraduate education.

John Tomlinson's arrival at Victoria in 1966 was greeted with much hope and expectation for the development of physical chemistry. However. this did not eventuate as staff came and went. Apart from Tomlinson, only Jim Pearce and Robin Speedy spent their careers in the institution (1973-2008 and 1976-1995, respectively). Jim supervised just one PhD student, Eddie Mroczek, jointly with Tomlinson, and the subject was hydrothermal reactions at elevated temperatures. Jim developed a major interest in the delivery of a sound chemical education, succeeding Gary Burns as the academic in charge of introductory studies from 1989 onward. He was also responsible for introducing computerized learning into the NZ academic laboratory and he provided many significant developments in laboratory software. Pearce developed the first operational laboratory microcomputer in 1976, some two years after microcomputers became commercially available. It was Jim Pearce who had Victoria's second-year physical chemistry students receiving microcomputer training as the first in NZ.[22] He also wrote in the 1980s

Paul Kilmartin & Yvonne Curtis at a laboratory computer (from unattributed newspaper cutting, VUW-S19)

Yvonne Curtis SCPS photo

(with Yvonne Curtis, Prof. Neil's wife) a series of chemistry-specific software programmes for the Department's four Microbee computers for use by students in a tutorial revision fashion. In the early 1990s Jim wrote a programme that allowed for automated indexing of documents (notably Halton's *Advances in Strain in Organic Chemistry*) that saved days of manual work. These contributions were significant but they did not help in building a research reputation for the physical area. Robin Speedy became independently wealthy and left the institution in 1995 to become one of the few to receive support from the (by then created) Marsden Fund as an independent researcher. His work led to four PhD submissions from the early 1980s. The last of his quartet was Richard Bowles, now an academic in Saskatchewan, who completed his study after Robin had made his formal departure from Victoria. The work encompassed detailed study from, for example, simple equilibrium statistical mechanical theory of dense hard-sphere fluid mixtures to superheated and supercooled water. It was dominantly *the structure of water* from theoretical studies that allowed him a relatively easy transition to private status. Despite the isolation that he gave himself, his reputation in the area became very influential and he was honoured with a symposium in mid-July 2010 entitled '*Down Under the Hard Sphere*'. He continued to make significant contributions to hard sphere chemistry until 2008 whilst formally removed from academia.

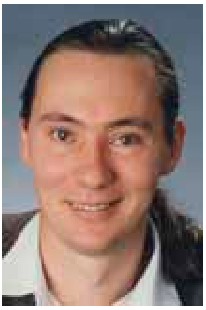


Robin Speedy, *ca*. 1990
VUW-S19

Of the other physical chemists, Barton left for Murdoch University in Perth, Western Australia, at the end of 1972 where he remained until retirement as emeritus Associate Professor. Martin Viney and Ekk Sinn were here for but two and three years, respectively, Ekk having supervised a PhD student. This was Herbert Wong who became the long standing DSIR NMR spectroscopist. Nigel Field died whilst playing squash in his third year here just as he was beginning to have an impact, while Digby MacDonald spent two years in the institution, but made little impression despite the subsequent glowing reputation that he has generated in the US. It was Stuart Smedley who added some stature to the physical chemistry area not simply from his electrochemistry research at high pressures, but from his development of a new form of viscometer. In addition, he was willing to take on the role of Departmental Chairperson when this was instigated from the beginning of 1981. However, the structure and career prospects in NZ academia were not to his liking, and he left for an industrial position in the US in 1988, by which time he had published some 25 articles from his Victoria work. He supervised two PhD students alone and one with John Tomlinson. His subsequent successes have led to a total publication count closer to 90 by 2012.

So it was that John Tomlinson, as a professor of physical chemistry, saw only

thirteen doctoral candidates in his sphere of influence over his 24 years at Victoria University, with just one more coming after his departure and prior to the move of Chemistry to join Physics as a School. More importantly, perhaps, is that John Tomlinson's retirement in 1990 served to mark the end of multiple chairs in chemistry. He was not replaced and no member in the physical area advanced to a personal chair in the first 100 years of chemistry at Victoria. Worse still is that his retirement did not furnish even a junior replacement. The Physical Chemistry area had to survive with Pearce and Speedy alone for that year. It was only after considerable discussions with the senior administration that the appointment of a new lecturer took place. Rodney N. Tilbury was appointed following a PhD under Terry Quickenden's tutelage at the University of Western Australia and a short period as lecturer in the University of Papua New Guinea. He began his duties in 1992 and was promoted to Senior Lecturer at the end of his first year after instigating his continuing research in bioluminescence, and specifically the luminescence of blood samples with a view to disease diagnosis, that led to two publications. Rod accepted voluntary redundancy in 2000 after the School of Chemical and Physical Sciences was put under internal review.



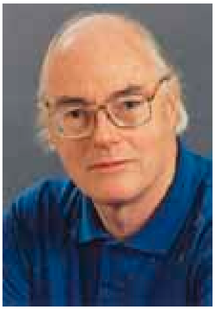
Rod Tilbury 1996
VUW-S19

Inorganic Chemistry Research

The same cannot be said for research in inorganic and organic chemistry as can for the physical area. James Duncan played a pivotal role in research from his earliest days in the institution and, with Alex Wilson and Neil Curtis, provided a driving force for research in the Department. Although Wilson stayed at Victoria for just 10 years from 1960, he had published three papers alone by 1962 and then 18 with his students that are attributed to this institution. Alex was one of those people who had his hands in many areas, but surface studies that used extensive radiochemical tracers dominated his Wellington efforts; he was the first to use the radiochemical laboratory. As noted elsewhere, Alex supervised some 9 PhD students during his short 10-year tenure, far more than any other academic in the history of the Chemistry Department, and he set the scene for serious advanced study in a laboratory all abuzz that others could not emulate. He transferred the same enthusiasm to Waikato University, established the Science Faculty there and continued to carry out research publishing some 35 papers to 1984. Then, he took a sabbatical from that institution never to return to serious academic study.

In contrast, the more sedate Duncan supervised sixteen PhD students during his 25 year reign and published some 56 scientific papers. The research topics ranged

from studies of iron compounds by his first candidate to aluminosilicates at high temperature, clays and pottery composites, to the study of glasses and the binding of iron to transferrin. But it was his activities in the political arena of '*future studies*' and science awareness that gained him the reputation that he held. The colleagues that James Duncan appointed to Inorganic Chemistry spent their careers in the institution.


Prof. Neil Curtis, 1987
VUW-S19

It is without doubt that, of the academics at Victoria University of Wellington, Neil Curtis is the one who has carried out most research at the highest international level. What is amazing about this man's career is that he supervised just eight PhD students and had no postdoctoral assistance, yet amassed in excess of 160 peer reviewed publications in the international literature over his tenure. He did have publications from the work with visiting scientists. Two publications were with V.C. Patel (from Sierra Leone; 1968) and three papers from work with Li Xin (from China; 1990-1991). Of his 160+ papers, 27 have him as sole author, whilst about 30 are with X-ray crystallographers whose expertise was needed for crystal structure determination. This, more than anything, demonstrates Neil's dedication to, and love of bench chemistry. The vast majority of his publications are research papers, seven jointly with his wife Yvonne and two with his daughter Linda. Neil gained his education in Auckland and had postdoctoral study with Sir Ronald Nyholm at University College in London before joining Victoria in 1957. He saw the transition from the old facilities in the Hunter building to Easterfield and then, at the beginning of the 21st century to the School of Chemical and Physical Sciences in the Laby building, the only member at Victoria to have served and researched on all three sites. Over the decade that Alex Wilson was at Victoria, Neil published some 44 papers – but with the assistance of just three PhD students.

The life work of Neil Curtis is inextricably wound with inorganic azamacrocycles. It was he who evolved the area prior to the involvement of Prof. Daryl H. Busch in the US but, coming from NZ in an era when there was little by way of international communication, he never gained the recognition that he truly deserved. There was some rectification of this by way of his 1996 retirement symposium and his *guest of honour* status at the 2012 International Symposium on Macrocyclic and Supramolecular Chemistry at Otago University. The significance of his work lies in its evolution alongside the studies of Cram, Lehn and Pederson that gave that trio the 1987 Nobel Prize for their development and use of molecules with structure-specific interactions of high selectivity. Neil's first publication in the area is from 1961 with '*Structure of some aliphatic Schiff-base complexes of nickel (II) and copper (II)*' with his then student D.A. (Don) House. It appeared in *Chem-*

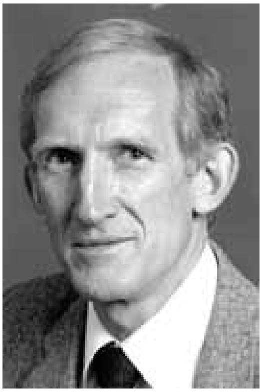

Neil Curtis in his laboratory, *ca.* 1995, courtesy of Yvonne Curtis

istry and Industry (London) and his publications continue to the most recent '*The preparation and structure of [*trans-*dichloro-{*trans-*6,13-dimethyl-6,13-bis-(N,N-dimethylformamidinyl)-1,4,8,11-tetraazacyclotetradecane}nickel(II)] diperchlorate dihydrate*' that appeared as an Inorganic Chemistry Communication in 2011 (**2011**, *14*, 1344-1346). Neil's long tenure at Victoria as an academic from 1957 to 1995 has been followed since then by his almost daily presence in the research laboratory as Professor Emeritus. His 1961 and 1965 students, House and Powell, rose to chairs in inorganic and analytical chemistry, respectively, at Canterbury University, and are both now emeritus. Neil was awarded a personal chair in 1971 by virtue of his outstanding research record and Fellowship of the Royal Society of NZ in 1975. He was accorded the chair vacated by James Duncan when the latter retired in 1986, becoming *Professor of Inorganic Chemistry* having had the theoretical component removed from the title that James had gained. Several of Neil's activities have gained him recognition above and beyond his actual research. As a Fellow of the Royal Society of New Zealand, Neil played a dominant role in reshaping the organization and in presenting to government its arguments for a duality in nature during his tenure as Hon. Treasurer and Vice-President, for which he was awarded its Marsden Medal in 1994. After his retirement he became Patron of the New Zealand Association of Scientists and still remains actively involved with its awards.


David Weatherburn, VUW-S19

David Weatherburn has been mentioned already. He came to Victoria in late 1972, began his teaching career at the start of the 1973 teaching year and remained until 2009, when he formally retired (though remaining on contract for a few more years). It is interesting to note that at the time of his successful application for Position 213, the Department comprised four Professors, two Associate Professors or Readers, eight Senior Lecturers, two Lecturers, five Jun-

ior Lecturers and eighteen technicians. There were twenty-five MSc and sixteen PhD students. David came as a co-ordination chemist, became interested in the bioinorganic area and then moved more towards environmental studies. He supervised five PhD students prior to 2000 and, of his 46 publications, 14 are jointly with Neil Curtis. Amongst his many attributes, David developed an ability to solve crystal structures from diffraction data sets recorded at Canterbury University from his earliest years and assisted many of his colleagues in this way. In contrast, Gary Burns, who came to Victoria in 1968 having been a student with James Duncan in the early 1960s and the inaugural recipient of the BP postdoctoral Fellowship for overseas study, supervised some 9 PhD candidates, two jointly and one an Alan Freeman student from after the latter's death. Gary was offered, and accepted, the position of Senior Lecturer in charge of First-Year Studies from the beginning of 1972. This was a year after the university authorities recognized the importance of the role and the need for a senior person, akin to Malcolm Carr, to take charge and this curtailed his activities until 1989 when Jim Pearce took over the role. Gary published some 48 papers from his supervisions. His research efforts were much advanced by finances that came from the French Government with their settlement of the 1985 Rainbow Warrior fiasco and the instigation of NZ-France science collaborations. Indeed, some of his students spent periods with Jacques Roziere at the *Laboratoire des Agrégats Moléculaires et Materiaux Inorganiques* in the University of Montpellier that blossomed in the 1990s. Gary became another to debunk to administration, serving a term as Academic Vice-Chancellor (1995-97) during which time the University Calendar accorded him professorial status for one year, but few, if any, in the Department were aware of this. Most of Gary's 48 publications came from the last 25 years of his tenure.



Gary Burns, *ca.* 1975 SCPS photo

Jim Johnston VUW-S19

The remaining long-serving inorganic chemist is Victoria graduate J.H. (Jim) Johnston who gained all of his qualifications in the Chemistry Department. Following his 1974 PhD with Duncan, he was appointed directly to the academic staff. Appointment to an academic position before undertaking postdoctoral experience had not happened since that of Dasent in 1953 and Monro before him in 1928. Initially, Jim's research continued with inorganic co-ordination chemistry and Mössbauer spectroscopy, but he took charge of the geochemistry area after it fell into some disrepute and retained this until the area was incorporated into the geological

sciences at the end of 1990. He gained four PhD students from that area. Subsequently, his major thrust has been in the applied chemistry arena, thus advancing the Easterfield/Duncan concepts that academic departments ought to look also to industrial advancement. His tenure from 1975 until the end of the first century of chemistry led to nine PhD supervisions, though there have been many more since, a good number coming from his interactions with colleagues in Nuremberg, Germany. This has stemmed from the applied chemistry that has given Johnston much success and kudos on the NZ and international scene, most notably from use of wastewater silica deposits, packaging, and the impregnation of natural fibres with precious metal nanoparticles. He was awarded the Thomson Medal of the Royal Society of New Zealand in 1998 and elected to its Fellowship in 2001. He has been one of the major users of Victoria's XRD/XRF facilities and is now *Director of the Centre for Applied Chemistry*. He has more than 50 publications, patents and numerous confidential industry reports.

Dr. Johnston assumed Headship of Chemistry after it amalgamated with Physics from mid-1997, as inaugural Head of the School of Chemical and Physical Sciences, a role he took through two terms and combined it with also serving as Deputy Dean of Science until late 2004. It was he who took the new School through its restructuring under Dean Peter Englert in 1999-2000. He was intimately involved with the remodelling of the Laby Building in the 1998-99 period so as to accommodate chemistry in its move to give a physically united school in early 2000. Jim was awarded a personal chair in chemistry in 2003.


Sally Davenport VUW-S19

Shorter serving inorganic staff were Sally Davenport and Olga Gladkikh. Sally Davenport was a 1985 VUW PhD graduate of Gary Burns and DSIR scientist Roger Newman, and she held a joint appointment between Chemistry and Business Administration in the 1992-1998 period. She forged the concepts of entrepreneurship in science that evolved to a full-time post for her in the School of Management. By way of contrast, Russian immigrant Olga Glagkikh was appointed to a three-year temporary lectureship in 1995, but with the downturn in student numbers and science funding she was forced to leave at the end of her contract even though she continued with several part-time and temporary research posts for a number of years. Her expertise was in crystal structure determination and she gained fourteen publications from her associations within the Department and subsequent School. Several of these were with Neil Curtis and David Weatherburn, and one with Robin Ferrier.

The last and still current staff member appointed to Inorganic Chemistry is John

Spencer. At the time of retirement for Neil Curtis in January 1996, Robin Ferrier's departure was signalled for two years later by virtue of the 65 year-old age limit for employment. Perhaps surprisingly given the climate, the Departmental Chairperson, David Weatherburn, had persuaded the University authorities that there was a real need for an established chair in Chemistry. However, because of the structural changes, this was to be labelled as a *Chair in Chemistry*. This was advertised in 1995 and John L. Spencer was the successful applicant. John, a New Zealander from Southland, had gained his education at the University of Otago and his PhD under Prof. Gordon Stone at Bristol University. Prior to coming to Victoria he held a Chair in Inorganic Chemistry at the University of Salford and had been actively involved in outreach work there. He arrived in March of 1996 and was appointed as Chairman of the Chemistry Department soon after, taking over from David Weatherburn mid-year. The role demanded much time as expected and made the relocation of John's research programme to NZ that much more difficult for him. Nonetheless, John persisted but made the conscious decision not to stand for appointment to the Headship of the School of Chemical and Physical Sciences that was formally established in 1997. His publications from Victoria, save for one with overseas collaborators, have come only since the turn of the century and numbered fourteen at the time of writing. He, like Curtis, is an organometallic chemist. His study is directed towards the synthesis of new transition metal complexes as novel and soluble homogeneous catalysts capable of optimization for use in key industrial syntheses and applications.

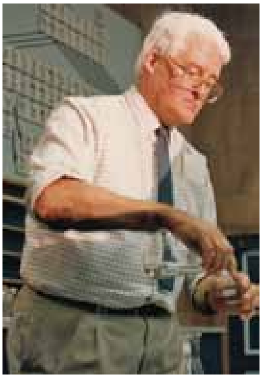

Prof. John. Spencer VUW-S19

Organic Chemistry Research

Research in organic chemistry dates from the first laboratory experiments conducted in 1899 by Thomas Easterfield in the upper rooms of the Victoria Street Technical School. It has continued unceasingly since then. The works of Easterfield, Robertson, Slater and Harvey have been discussed in the earlier, more historical, sections and what follows here records the studies during the tenure of Professor Robert (Robin) J. Ferrier that began in late 1970.

Robin Ferrier, a graduate of Edinburgh University, was appointed directly from PhD to a lectureship in chemistry at Birkbeck College, London, in 1957. From this he took a sabbatical working in Melvin Calvin's laboratory in Berkley, California, at the time that the latter was awarded the 1961 Nobel Prize in Chemistry. As noted earlier, Slater's move to Victoria's administration in 1969 was the essential trigger

for an independent chair in organic chemistry and this was advertised and filled by the end of June 1970, the institution having interviewed two candidates. The appointment went to Ferrier, another natural products chemist, this time working in the field of carbohydrate chemistry.



Prof. Robin Ferrier
VUW-S19

Ferrier's arrival was a few months ahead of the long summer break of 1970 and he utilized the time to familiarize himself with the institution and its laboratory arrangements so that the two students he had negotiated for Victoria to support, Geoff Bethell a PhD candidate, and Dr. N. Vethaviyasar, a postdoctoral fellow, could settle to research immediately on arrival in mid-January 1971. Vethaviyasar gained five papers from his time with Robin, and Bethell his PhD (from Birkbeck College, London), six publications and a Wellington wife - who was the Departmental Secretary at that time. It was during Bethell's tenure that Robin gained his first NZ doctoral candidate, Richard Furneaux. Richard did his MSc study under physical chemist Ekk Sinn but moved to organic as his career choice. With a Victoria graduate in tow, Ferrier began to show the department his way of doing research. During his 27 years of service to Victoria, Robin supervised 11 NZ PhD candidates, one of whom, Steven Holden, submitted some four years after Robin's formal retirement (but the study was on the synthesis of C_{60} rather than in the sphere of carbohydrate chemistry).Two of these PhD students were women, the first the 1972-1983 organic technician, Regine Blattner, who had participated in 'summer' research under Robin and found the work too attractive to do anything other than register for a part-time PhD. She had a successful submission in 1982.

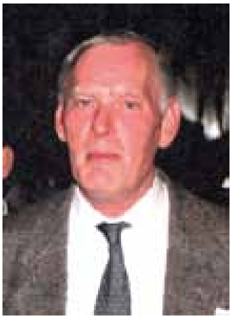
Ferrier's research at Victoria continued his thrust of treating carbohydrates as normal organic chemicals and specializing in using them as starting materials for the synthesis of non-carbohydrate compounds of value in medicine. Always he viewed *Carbohydrate Chemistry* as above other aspects of the discipline and vital to the needs of the country. He espoused the view that NZ should evolve its own specialist pharmaceuticals industry, though the development of Douglas Pharmaceutical in the latter part of the 20^{th} century did not fit to his ideals. The successes that he achieved are none better shown that the addition of his early PhD graduates Richard Furneaux and Peter Tyler to the old DSIR Chemistry Division and their successes; Regine Blattner joined them after her graduate studies as the university was unable to pay for a PhD-qualified technician. To a large extent, these people represent the skill-base on which the (now) IRL carbohydrate team, reputed to be the largest in the world with some 30 members, depend. Their specialty lies in the rational design and synthesis of carbohydrate-based drug candidates and in the

isolation and characterization of carbohydrate-containing products from natural sources.

By the time Ferrier arrived in Wellington, the formerly traditional Chemistry Library had been re-absorbed into the main university collection. This allowed for expansion of the Departmental Office from its initial position on Level Four of Easterfield to the north-east sector of Level Three with a secretary housed outside this. Ferrier's arrival led to an office-cum-laboratory being created for him at the opposite end to the Head's office in the old library. He remained there throughout his tenure though the lab received remarkably little use. Some bench chemistry was conducted in his first year but little after that, a feature common to almost all of the academics and caused dominantly by the hours needed to cope with the teaching duties. Robin's ethos was excellence in chemical research and he supervised a good number of Honours candidates in addition to his PhD people. During his time at Victoria, he published some 110 papers that include several reviews, and, additionally, the *Annual Report* on Carbohydrate Chemistry to which he contributed then edited for a total of 28 years. He published two texts with Peter Collins (Birkbeck College) entitled *Monosaccharide Chemistry* (Penguin Library of Physical Sciences: Chemistry, 1972) and *Monosaccharides: Their Chemistry and Their Roles in Natural Products* (Wiley, 1995). He gained FRSNZ status in 1977. As noted earlier, his main claim to fame lies in two reactions named after him, both termed *The Ferrier Reaction* that were discovered within his main area of unsaturated carbohydrates.

Robin Ferrier espoused the view that almost any pair of hands in the laboratory was better than none and many of his graduate researchers found life difficult. While he produced excellent results from his own bench work, he rarely devoted time to teaching his graduate students how to go about their laboratory work. His philosophy on library work was that it was to be done by the supervisor with the 'pairs of hands' pushing back science's frontiers at the bench. Nevertheless, success came to the students if publications and effective thesis submissions are considered. Ferrier's era in the Easterfield Building certainly added international status to the Department. From his earliest days in the institution, Robin was committed to collaborative research, proffering the view that with few research students – there were never more than four organic PhD candidates at any one time – the only effective way to carry out research was in collaboration. But these did not eventuate as has been discussed earlier (see p. 49). Bob Hay accepted an offer to a Readership at the University of Sterling and left after Ferrier's first year at the end of 1971.

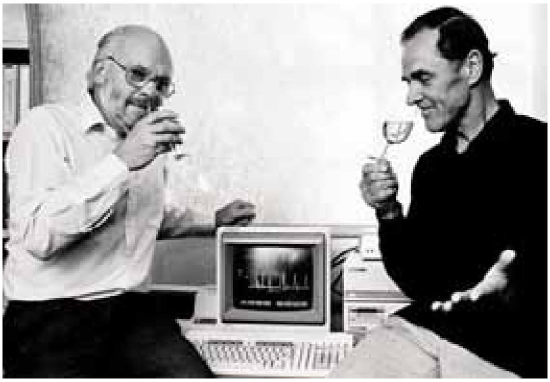
With Bob Hay's departure, Robin Ferrier argued for the number of lecturers in the organic area to be reduced to four, with the salary saving not being available to the central administration but used for two 'organic' Junior Lectureships, thereby



Bob Hay From an SCPS photo

securing continuing funding for two PhD students. In this he was successful and the organic staff dropped from the five on his arrival. The number of four worked well, even when one member was away on sabbatical leave. The availability of the Junior Lecturer posts ensured two research students and the positions were fairly divided between him and Halton, except when one was vacant and a former Ferrier student was to return home from overseas postdoctoral study. By the time Ted Harvey formally assumed the Registrarship in late 1979, student numbers had dropped and his lectureship was lost. Thus, from 1981, organic chemistry was taught by the trio of Ferrier, Halton and Craig until the last's retirement in early 1991 when arguments for retention were fraught with major difficulties and only a limited term half-time post could be salvaged.

John T. Craig and Robert W. Hay both entered Victoria University in 1962 as lecturers appointed by Stanley Slater. John had gained his PhD degree from the University of Edinburgh under Prof Neil Campbell's direction in the area of polycyclic aromatic compounds. He had a couple of papers from his work there and continued in the same vein at Victoria, generating three papers from his own bench work that appeared in the *Australian Journal of Chemistry* in 1965, 1966 and 1970. The research students that studied under John's tutelage were BSc and MSc Honours candidates, yet he published some seventeen papers, mainly in the 1960s and 1970s, one with Halton as a co-author and three others jointly with the Halton group. All were in the area of condensed aromatic systems, *e.g.* pleiadene, 7,8-dihydrobenzo[4,5]cyclohepta[2,3,3-*de*]naphthalene and a derivative of cycloheta[*opqr*]benzo[*c*]phenanthrene. Sadly, John never attracted students over highly regarded Hay, Halton and Ferrier and by the mid-1980s he had moved his interests into analytical GC-MS studies of volatiles, dominantly in wines. He also undertook some work with John Tomlinson on spirits shortly before the latter's retirement. John Craig was painstaking in both his work and his publications, though few gained high kudos.



John Craig and John Tomlinson - wine analysis, SCPS photo

In contrast to John Craig, Bob Hay was the powerhouse of research in chem-

istry during his short nine-year period at Victoria. During his tenure he provided 44 publications, with three as the sole author from shortly after his arrival. He supervised three PhD students (submissions were in 1967 and 1968) from work continuing the theme of P.W. Robertson – elegant physical organic chemistry that involved readily available chemicals to obtain products for which physicochemical measurement provided much needed data and a surfeit of publications. He moved to co-ordination chemistry and returned to Scotland as an inorganic chemist. The subsequent closure of the Chemistry Department at the University of Stirling, led to a consequential move to St. Andrews and this provided him with the much justified Chair in Chemistry and the recognition that he deserved.

The almost 36 year tenure of Brian Halton at Victoria places him as Victoria's longest serving organic chemist. From a PhD under the direction of Prof. Richard Cookson at Southampton University in 1966, and a postdoctoral year followed by an Assistant Professorship at the University of Florida, he was the last academic appointed to Victoria by Prof. Slater. He arrived in September 1968. Like Neil Curtis, he was appointed to a personal chair in chemistry (1991), only the second such appointee in the first 100 years of Chemistry at Victoria. This is not to belittle the promotions of Johnston, MacKenzie and McGrath in the new School of Chemical and Physical Sciences that have taken place in the 21st century, and the now recognized and routine promotion path to this, the most senior, level.


Brian Halton, *ca.* 1992, VUW-S19

From his arrival in Wellington, Halton began to establish himself on the international scene. He evolved an area of organic chemistry, described by many as physical organic, which encompassed highly strained aromatic ring systems. Thus, while continuing the theme of 'physical organic' that had emerged, he set off in a different direction. The dire malodour of many of his synthetic compounds enhanced the reputation of the Easterfield Building as the home of chemistry. He supervised eleven PhD students during his time in the institution and recruited two postdoctoral fellows. His studies led to more than 150 papers together with a series of reviews, an edited book series on *Strain in Organic Chemistry* and, with Prof. Jim Coxon of Canterbury University, a 1974 textbook on *Organic Photochemistry* with Cambridge University Press that went into a second edition in 1987. His work was recognized by the award of the Research (1974) and Shorland (2002) Medals of the NZ Association of Scientists, the ICI Prize for Excellence in Chemical Research by the NZ Institute of Chemistry (1980), and his election to RSNZ Fellowship in 1992. A characteristic of Halton's research at Victoria was the number of significant international collaborations that he engendered. Throughout his career in the institution, New Zealand lagged behind the Northern Hemisphere

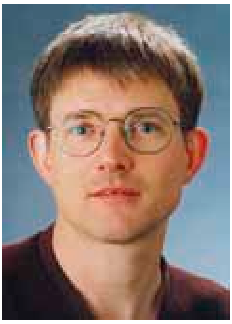
countries in gaining modern instrumentation and/or having expertise with developing techniques. To keep pace with the active scientific world, he persuaded colleagues overseas to provide the facilities that Wellington lacked and encouraged many joint programmes. The advances with strained molecules that he was able to provide came, in large measure, from such interactions. His time at Victoria was also characterized by service to the profession, rising to the Presidency of the New Zealand Institute of Chemistry in 1986-87; this was then followed by an eighteen-year involvement with the Congress of Pacific Basin Societies (Pacifichem) that saw Australia and New Zealand as the first non-founding countries formally admitted to the organizing committee in 1990. Pacifichem has now become the foremost international chemistry congress worldwide; NZ still retains its position on the International Organizing Committee that Halton negotiated. Ill health forced him into an early retirement in 2004, but, like Curtis, he maintains an office in School and is there daily continuing with much writing and editing.

The retirement of John Craig in January 1991 was preceded by pressure being placed on the University Administration by Robin Ferrier who sought permission to advertise for a new appointee. Student numbers had decreased and contraction was mooted. However, with some 200 lectures still given in the area of Organic Chemistry, a limited term position was secured for a three year period. Christina Chai, a PhD graduate from the Australian National University under Prof. Athol Beckwith, was the leading candidate and she was interviewed in London by Halton. However, by the time that his (favourable) report reached the VUW administration the position had been downgraded further to a part-time one. Ferrier secured the assistance of DSIR Chemistry and a three-year limited term joint position was formed, which Christina accepted. She arrived in Wellington in February 1991 to find that the Introductory Chemistry course, as well as a share of the senior undergraduate and graduate work, had been allocated to her by Ferrier. Her research work, which involved organic radicals in biologically-oriented systems, was to be with the DSIR, but with research students at the university. Her three years at Victoria were fraught with frustration as the job allocated her was too much for any one individual, and was beyond the now defined university norms. Christina took on an MSc research student, supervised him jointly with Halton, and gained a publication from the results. By late 1993, at the time Christina's temporary lectureship was drawing to its conclusion, a decision was reached that this would revert to a permanent fulltime lectureship in organic chemistry. However, by then, Christina Chai had secured a permanent appointment at her *alma mater*, the Australian National University, and

Christina L.L. Chai, 1991
VUW-S19

was sufficiently disenchanted with Victoria not to be persuaded to stay.

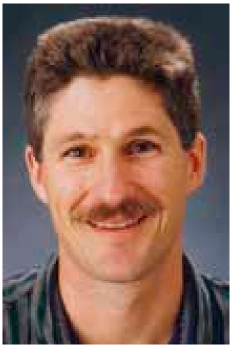
The reinstated position was advertised in the latter part of 1993 and an appointment made directly from the applicants without recourse to interview. The successful candidate was Dr. Peter Northcote, a PhD graduate of the University of British Columbia coming from the pharmaceuticals industry with a speciality in marine natural products. He had spent a year teaching high school in Tonga prior to graduate study, which had been followed by a postdoctoral with the Blunt-Munro Marine Natural Products group at Canterbury University and so he was not new to NZ. As has been discussed earlier, Northcote's presence was precisely that needed to raise an awareness of the outdated 80 MHz permanent magnet NMR instrument and the need for a multinuclear facility. A 300 MHz superconducting instrument was installed in late 1996. Once funding for the replacement seemed secure, a single difficulty remained, namely with Robin Ferrier. He was unconvinced that anything beyond the FT80A was needed for organic chemistry. It was only when the exorbitant cost of having such an instrument specially constructed was obtained and given to him did he relent. The availability of good multinuclear and 2D NMR facilities played a major role in getting Peter Northcote's marine chemistry research established. The serendipitous discovery of peloruside A from a native sponge and its potency as an anticancer treatment has had a major impact on Peter's work. His first PhD student submitted his thesis in 1999 and a series of exceptionally talented candidates has followed. Although Peter gained few publication in his early years (a couple jointly with Halton where Peter's NMR expertise was used), he is now internationally established and has brought much recognition to the School from the peloruside work. At the time of writing his publication count is over 100 items.



Peter. T. Northcote, 1994, VUW-S19

By the time of Robin Ferrier's retirement in January 1998, the university had made no decision about a replacement and Northcote and Halton were left to cope with the more than 200 lectures in organic chemistry that year. However, by the end of the mid-year break a decision to employ a new permanent lecturer with expertise in the organic area had been made. The post was advertised internationally and John Hoberg, working in the National Energy Research Laboratory in Colorado, was interviewed by telephone and subsequently appointed. He arrived in late November that year, the first chemist to be appointed to what had become the School of Chemical and Physical Sciences in 1997, and the last to enter the Easterfield Building. Like Ferrier, Hoberg was a carbohydrate chemist. He set up a programme that encompassed unsaturated derivatives and rapidly established his popularity with the students, gained a significant number of Honours candi-

dates, several of whom proceeded to PhD study. Ghislaine S. Cousins was the first of these starting in 1999 and submitting a 2003 thesis entitled *The use of chiro-inositols in asymmetric synthesis*. Hoberg's arrival marked a major change in the way that organic chemical research is carried out at Victoria. From its inception in 1899, research had been performed in chemistry by sharing the limited equipment available among the staff. However, 100 years later, government pressures were for researchers to combine into units and develop named entities. Thus, John Hoberg arrived in 1998 to set up his own laboratory in the combined School of Chemical and Physical Sciences that moved to the Laby Building during the latter part of 1999. He was to seek internal and external collaborations. Much of the formerly communal equipment was relocated to his laboratory following the move and he rapidly gained publishable results, having some 18 papers from his five years at Victoria. John's time in Wellington was far from easy because his wife found settling to the NZ lifestyle, away from family, difficult. This culminated in mid-2003 with John tendering his resignation. He returned to the US with his family, to a position at the University of Wyoming, just ahead of Christmas that year. Both he and Halton were replaced in 2004.



John O. Hoberg, 1999
VUW-S19

Chapter Eight

The Evolution of Chemistry Teaching

As discussed at the outset, the teaching of chemistry at Victoria began on Tuesday, April 11, 1899, when Thomas Easterfield began to instil the learning of chemistry from original experimental work in the laboratory at the Technical School. Very soon after his arrival, he was asked to provide a course in scientific thought for lawyers. This he did, but, more importantly, he started his teaching of chemistry that led to significant numbers of students. In 1900, the first calendar was produced by Victoria College and it lists the coursework, which in chemistry comprised three lectures per week given on Tuesdays and Thursdays from 5-6 pm and on Saturdays from 9-10 am. This last class was followed by a three hour practical until 1 pm. The course fee for lectures was £1-11-6 (one and a half guineas) and the laboratory programmes double that. The first-year course, entitled *General Chemistry*, consisted of three parts: the Chemistry of Non-Metals, the Chemistry of Metals, and Organic. Part I was described as 'non-metallic elements, laws of combination, and elementary theory', Part II as 'metals, their occurrence, extraction, detection and quantitative estimation', and Part III 'organic chemistry including organic analysis, general methods of purification, identification, and relationships of typical organic compounds'. The academic year was set at 24 teaching weeks split into two terms, the first running from the second Tuesday of April until the end of June and the second from late July until late October. Examinations immediately followed the second term and for these the professor set (and collected) fees as appropriate remuneration for the assessments. A year later, student numbers were such that

Easterfield had to offer the practical class over three two-hour sessions (Tuesday/Thursday 7-9 pm and Wednesday 3-5 pm) as well as that on Saturday morning.

The year of 1901 saw a *Preliminary Course* designed to meet the requirements for a pass in the subject. It met twice weekly '*for the purpose of demonstration*' although the laboratory was '*open at other times for student convenience with 5 hours per week being required*'. It included simple inorganic properties, elementary quantitative analysis and qualitative analysis. Pharmaceutical chemistry was provided in January and February of that year. From the outset, Easterfield's overriding criteria in providing an education in chemistry were to introduce the beginning student to the nature of the discipline, train him/her in its intricacies, and complete the study so that every graduate was capable of entering any laboratory as a professional chemist.[3] The detailed nature of the courses down the decades was set for part-time study and had a content that varied as one would expect, advancing with the evolution of the subject matter and science in general. Thus, the Saturday morning lecture continued as a matter of routine until 1936 and the 10 am laboratory for several years more.[4]

General Chemistry was the forerunner to an *Advanced Course* that ran over two years and comprised two lectures of one hour each per week.[4] It was the course required by Honours students, professional chemists and teachers. In the period from 1902-1905, it consisted dominantly of organic chemistry, only physical chemistry in 1906 after the move to Kelburn, and then, from 1907-1909, organic and physical. The year 1910 saw the description of the degree simplified. The different years of study became labelled as Chemistry I (the General Chemistry of 1900), Chemistry II (Organic Chemistry), and Chemistry III (Organic and Physical Chemistry). Students were encouraged (and expected) to spend time working in the laboratory. There appeared to be flexibility in the teaching times as organic was '*to be arranged*' for many years from 1900 onwards. The impact of World War I was a more regulated schedule in place from 1916. Thus, while Chemistry I was run as earlier, Chemistry II (Organic) was set for Wed/Fri lectures at 5 pm, and Chemistry III (the Advanced III course) ran on Mon/Wed/Fri at 4 pm; Honours lectures were then scheduled at four one-hour sessions per week. Until 1922, the Victoria calendars list the staff in each subject by courses taught [Easterfield (to 1919) and then Robertson for 1920 and 1921]. By 1921 the academic year had been split into three terms, but with the twenty-four week teaching year retained. Interestingly, this remained with only the minor tweaking of vacation periods, study weeks and the like, until recent times when the summer trimester was introduced. This then provided for a 36-week teaching year overall, but its impact on Chemistry was minor as only one summer course was offered and designed for those needing a refresher or basic course in the subject.

Prof. Robertson's appearance on the scene in 1920 led to a 1921 Victoria Uni-

versity College calendar with far more regulated times for chemistry. The University of New Zealand had replaced 'Honours' in a subject with an MSc with honours in 1919 and this became the routine advanced course in chemistry. The MSc (Hons) course replaced laboratory research work in the undergraduate programme that previously had led to 'Honours'. The 1920 General Chemistry programme retained evening and Saturday lectures, but a Friday evening tutorial was added to follow the lecture. This first-year course became the prerequisite for further study in chemistry, and was termed a *Pass*, sufficient to complement major study in other disciplines. This set a prerequisite scene that Victoria has continued to follow. Such courses contributed to the BSc degree, which by then required the completion of either four pass and two advanced or five pass and one advanced courses. The Advanced course met for three one-hour lectures per week (4-5 pm) and ran over two years. Honours lectures continued to be scheduled by arrangement. Bobbie Monro took up his position as 'Assistant and Demonstrator' in 1922 and the calendar records both his and Robertson's name. The laboratory courses comprised four hours per week for the Pass Course, three for Elementary Organic, but 12.5 hours per week for the Advanced Courses. In 1925, for the first time, the calendar specified that the General Course was to be taken by BA/BSc, Engineering Intermediate, Engineering External, and Medical Intermediate students (who also had to take the Organic course). By 1926 all the lectures were during the daytime (before 5 pm) with the 3 x 1 hour lecture format retained. However, a one hour tutorial was added to the schedule. The laboratory timetable was further rationalized. The Pass course was allocated 2 x 3 hour labs per week, the Elementary Organic 1 x 3 hour per week, and 3 x 3 hour plus 1 x 3½ hour for the advanced courses. By 1930 it was possible to take Chemistry II as a single subject and this comprised Elementary Organic taken together with the second-year Advanced Organic. It has to be assumed that Robertson provided his courses, and especially those at the graduate level, with the evolving concepts of the electrophile, nucleophile and radical as proffered by Christopher Ingold in the late 1920s. Development in crystallography through the work of the Braggs, father and son, became entrenched throughout the empire and must have featured as well.

It was in 1934 that the academic system for a degree was clarified even further. Each of the three years of study in a discipline was termed a *Stage* with first-year chemistry becoming Stage I rather than General Chemistry. Chemistry at the second and third year levels (Advanced first-year and Advanced second-year as they had become known) became Stage II and Stage III, and their labs were set at 6 hours per week at times by arrangement; this remained in place until 1943 when the Stage II course was broken into A - Organic and B - Inorganic and Physical. The year of 1934 also saw an elementary Inorganic lab programme put in place at five hours per week while the introductory Organic lab course retained its 2.5

hours each week. 1944 saw equal recognition of the sub-disciplines with a division of the Stage III course into Organic, Inorganic, and Physical. Laboratory times were set at eight hours per week. The Honours (MSc) lectures continued to be scheduled by arrangement.

It was in the years immediately after the Second World War that tertiary education gained much emphasis. From 1947, students of chemistry, for the first time, were formally advised through the College Calendar to '*have Physics I before attempting Chem II, and Maths I before Chem III*'. Dr. Walter Metcalf, a specialist physical chemist, arrived that year as the second lecturer in chemistry to supplement Robertson and Monro. Lecture course requirements changed to give each of the Stages an allocation of three one-hour lectures each week. Stage I had a 5 hour lab per week while both Stage II and III were allotted 7½ hours per week, all as 2½ hour sessions. The class size at Stage I was such that it had to be divided into A and B streams, something that remained in place into the 1990s save for the A/B designation. After Slater's arrival in 1950, Chemistry I was formally divided and 1951 had two examinable University Course papers, numbered 150 and 151, but there was no independent course description for them. Rather, Chemistry I was stated as covering general chemical theory, the chemistry of the common elements and their compounds, and an introduction to organic chemistry. It is the examination papers of that year that show Paper 150 to assess general and inorganic chemistry, while Paper 151 had a compulsory section on organic chemistry that carried some 33% of the weighting. By 1960, this last had risen to 50% of the second paper – 25% of organic chemistry overall. It was in 1954 that Chemistry I and II had their lecture loads increased to 4 x 1 hour each week, but Chem III remained with one lecture less. Ted Harvey and Bunt Dasent were on board as lecturers then, while Metcalf left for Canterbury at the end of the year. In 1956, when England and Johns arrived, the requirements of subsidiary subjects for chemists were tightened; students were advised to have Physics I and Maths I *before* entering Chem II *but requiring them* before Chem III'. The lab course for Chem III was increased to 10 hours per week. For the first time, there was a detailed prescription of the Honours programme with courses in inorganic, organic and physical chemistry allocated. There was also a fourth examination paper designed *to test the candidate's depth of knowledge in the subject*, something experienced by the author in the UK. In 1958, and in the Easterfield Building, the lecture programme for Chem III was increased to four one-hour lectures per week.

The year of 1959 had Monro, Dasent and Curtis in the inorganic area, Slater, Harvey and Johns in organic, England and Matheson in physical, and Truscoe and Briggs in biochemistry. The College Calendar spelled out in much more detail the courses available. The second year of study in chemistry comprised University Courses 152 and 153 (152: Organic; 153: Theoretical Chemistry, Applica-

tions to some elements, and Elementary Physical Chemistry). At the third-year level, University Courses 154-156 continued to comprise of Inorganic, Organic and Physical. Most notable was a new Stage III course, *Applied Chemistry I*. It was offered as an '*An introduction to the applications of chemistry to industry'* and had Chemistry II, Pure Mathematics I and Physics I as prerequisites. Alex Wilson was appointed from 1960, ostensibly to teach this programme, but it was replaced in 1965 (until 1971) by *Instrumental Techniques,* including those used in nuclear chemistry. Radiochemistry was an area in which he and the 1962-appointed Professor Duncan were actively involved. MA/MSc Honours courses remained as described for 1954, and the thesis counted as two papers. The presence of Truscoe and Briggs allowed biochemistry to be introduced at the second-year level in 1958 – Biochemistry II. It was followed in 1959 and 1960 with Biochemistry III and the postgraduate MSc Hons programmes, respectively. However, space constraints restricted intake to 14 second-year students, despite more than twice this number wanting to take the programme.

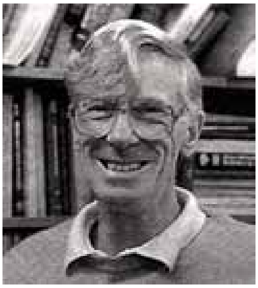
Some of the 1957 Chem III class in the Organic Laboratory of the west wing Chemistry Building: L-R: A. David Ward, David Usher, Don A. House, Iivi R. Alet, Beverley Major. Absent: David A. Andrews, Margaret M. Blight, Dan J. Gallop and Keith R. Miller. Photo and caption courtesy of Don House

More important than any of the changes to chemistry in 1959 was Victoria University College's rejection of calls for more specialization. Instead, the College

established the *Type B* BSc degree.[15,23] This division of the degree into two distinct types was designed to provide candidates with a choice between specialization and a general education.[24] The Type A degree required students to take eight one-year courses (units), three of which had to be beyond Stage I with one of them at the Stage III level. Moreover, a minimum of four subjects had to be taken and selected from areas defined by the faculty. In comparison, the Type B degree required nine units that included three subjects at Stage II. The increased workload was to compensate for the more general nature of study. The lecture loads remained as set and continued through 1963 with no change to the laboratory components (5, 7½ and 10 hours per week for first-to-third years, respectively). The ideal of the Type B degree was reaffirmed by the University in 1964, but the number of subjects required was reduced to three, and half-units were introduced. The half unit concept was to allow students to split their workloads and gain more flexibility in covering their range of interests, whilst at the same time providing added flexibility for the part-time students, then numbering 4083. In chemistry, the division gave Chem 152 and Chem 153, as defined above. They became 152: organic and general chemistry, and 153: inorganic, physical and general chemistry, in 1966. The introduction of half units to Stage III Chemistry could only be reconciled by having two of the three papers (inorganic, organic and physical) comprise one half unit and the one not taken becoming the second half unit option. However, no candidate was allowed to take the single paper until the two-paper half-unit had been passed. In 1964, the only Professor of Biochemistry, John Smith, joined the Chemistry Department but he was never to submit to the half-unit concept in his area.

The changes were significant for organic chemistry as it was the area least well covered in the senior high school, even omitted when pressures mounted, because it was examined only minimally in the University Entrance Scholarship papers. It was from about the end of 1960 that the chemistry profession pushed for more competent chemistry teachers in the secondary schools as then, even as now, most of those giving the introduction of chemistry to the minds of the future were teachers trained in the biological sciences, often with little more than a first-year university course in chemistry. Consequently, the university chemists saw a real need to ensure that the discipline content met requirements nationally and there were annual (later biennial) meetings of selected staff to see just where each department was going with its course content and its developments. Additionally, the encouragement of teachers gained momentum with short courses and afternoon symposia for them. At Victoria these gained favour with the Education Department and secondary science teachers were given time off to attend, especially when they were merely a half-day. The courses covered advances in the subject, ways to better present fundamental concepts and an encouragement of laboratory work. The essentials of ‘Safety in the Chemical Laboratory’ were demonstrated and provided

in the Burgess *Laboratory Hazards* handbook that many schools had requested. Practical demonstrations of how to safely handle the chemicals and glassware permitted in the school labs of those days were always in demand. Initially, the courses were infrequent, often every second year, but as time passed the concept of *outreach* gained momentum to the extent that teachers' days are now a routine part of the departmental calendar. School children of all ages are now brought to the institution on visits. But such growth and extension of effort is not new – recall that Easterfield's first class was to a group of lawyers, that *conversaziones* took place in 1912, 1928 and 1959, and that other open days were common.



Prof. R.G. Burns, Victoria's first geochemist, from an unattributed newspaper cutting, VUW-S19

It was from about 1967 that a mood for change began to permeate the halls of Victoria and it continued in one guise or another for almost 30 years; the Chemistry Department never adequately came to grips with it. Firstly, all course numbers were changed across the university and then, in 1968, Geochemistry was introduced as a half unit at Stage III with the area taken on by Alan Taylor as R.G. Burns left for the UK in 1967. As an aside, R.G. had accepted a lectureship at Oxford University and subsequently became Professor of Mineralogy and Geochemistry at MIT; he died of cancer in early 1994. Discussion and debate on the need for courses to be divided beyond the half-unit began in 1970 as every department in the faculty, except Biochemistry, operated them. The debate raged for almost two years and quarter units appeared in 1972. Simultaneously, the number of units needed to gain a Type A degree was increased for new students to nine, and 9½ units for the Type B degree unless a Stage III unit was included. But this alone did not satisfy the changing culture as a need for *credits* rather than *units* gained support and was deemed more relevant. Credits were introduced from 1973 while the quarter-unit equivalents continued and embraced the higher levels of the faculty by 1975!

The 1972 inclusion of quarter-units into the chemistry syllabus was fitted only to the old Instrumental Techniques and the Geochemistry third-year courses. The half-unit of Geochemistry was divided into igneous geochemistry, and sedimentary and metamorphic geochemistry quarters. In the same way, the full-year Instrumental Techniques course became chemical analysis, industrial chemistry, isotopic techniques, and physicochemical methods; each had two lectures and a 4½ hour laboratory work per week over half a year. Chemistry II and III had their laboratory times changed to six and nine hours per week, respectively, but divided among the three sub-disciplines. However, first-year chemistry, Chem 101, retained its two examination papers and three lectures, but had one three-hour lab class per week over the full teaching year. In addition, the science-commerce area was re-

addressed by providing a quarter unit on industrial chemistry. Much later, in the 1990s under chemistry-commerce lecturer Dr. Sally Davenport, the area received more relevant attention. Impetus for change was external to the Chemistry Department, whose staff were uninspired by the proposals. Nonetheless, compliance was essential and the subject of chemistry was fitted to the changes.

By 1972 the number of first year students had dropped from a maximum in excess of 400 to 268. The funding mechanism moved to reward student numbers so that each department sought to teach everything that its students needed to maximize its own intake. Biochemistry continued rigorously to demand that its students passed the first-year chemistry course, even recommending second-year for some. However, most other science departments moved to have chemistry deleted from among their requirements. By 1975, the number of second year students was in the mid-40s and those at third year about one half that. The Honours cohort was six. Thereafter, numbers fluctuated slightly to be followed by a decline that was triggered by more and more specialized courses appearing.

The Department had major difficulties in dividing teaching times among the three sub-disciplines of inorganic, organic and physical and spreading these over what had become the traditional, but uneven, three-term twenty-four week academic year. Coping with quarter-unit courses proved difficult as three into two has never provided a satisfactory solution for chemistry; some of the *quarters* were contrived. The Type A and B degrees were reduced from 9 and 9½ units to 108 and 114 credits, respectively. An academic year of study in every subject was equated to 12 credits and this included the laboratory component. The Type A degree required a minimum of 24 credits from 200-level (the old Stage II) with at least 6 credits in each of two different subjects, and 12 credits at the 300-level. The Type B degree specified a minimum of 36 credits at the 200-level with restrictions on 24 of them. The decline in science numbers and the government move to fund full-time student equivalents, persuaded the various disciplines to maximize their numbers (“bums on seats” being the vernacular of the day). Offerings were expanded and much of what was offered became a necessary component for a student of that subject, all within the maxims of the BSc degree.[24]

Chemistry II had to be divided into quarter units in 1973. These became Chem 201: Structure, bonding and spectroscopy; Chem 202: Inorganic chemistry; Chem 203: Physical chemistry; Chem 204: Organic chemistry. Each was taught at two lectures per week for twelve weeks over one semester, with each course having six hours of laboratory instruction per week over six weeks (36 hours in total).[24] Chem 201 was taught jointly between the inorganic and organic chemists with emphasis on spectroscopic analysis. The division of Chemistry III into quarter units followed in 1974. It saw the range of offerings increased, but the University reduced the degree requirements that year by six credits to 102 for the Type A degree and

1961 Chemistry Field Trip: Desert Road stop showing the transport (above) and, (left) Janice Gumbley, Dick Jones, Lester O'Brien, Paul Buckley and Don House (photos courtesy Neil Curtis).

108 for Type B. With the six quarter-units that came from the old Instrumental and Geochemistry programmes, inorganic had three new 3-credit courses and a total of seven, although two of these had contributions from organic and physical staff. Organic offered three 3-credit quarter-units and a contribution to the spectral interpretation component of the physicochemical methods quarter-unit. Physical chemistry broke out to offer four three-credit courses, one of which was Biophysical Chemistry. Each course had 24 lectures and one 4½ hour lab per week over 12 weeks. For industrial chemistry the labs were replaced by case studies and site visits. This is not to say that these were the first such occasions. From as early as 1961, industrial visits were organized and, as shown above, these often involved long journeys north to the various industrial plants, usually during the mid-year winter break.

The sixteen 3-credit courses under offer in 1974 were subjected to enrolment minima and prerequisites for graduate study were clearly laid out. Nonetheless, the following year saw the spectroscopic instrumentation taken out of Chem 333 (Physicochemical Methods) and a new 3-credit course, Chem 341: Mechanism and kinetics of chemical reactions, introduced. This was given jointly by the organic and physical practitioners. The number and nature of these 300-level three-credit courses varied, particularly among the more specialized offerings, but it is not surprising that the range was too great to survive. By 1976 the growth in science had ended, reversed, and was in decline. The number of first-year students was down from the 404 of 1971 to *ca.* 250. Thus, the third-year 3-credit offerings were reduced to thirteen in 1977, and then the three-credit course in analytical chemistry (Chem 301) was transferred to the 200-level in 1979 with a new 300-level analytical offering introduced in 1980. Nonetheless, it was clear that quarter units did not work for chemistry. When combined with course offerings elsewhere in the faculty, discussion led the Chemistry Department to remove itself from them and revert to 6-credit courses in 1981. Throughout the 1970s period of change, the 100-level course simply transposed from a Stage I unit to a full-year 12-credit course.

In 1981, the 200-level 6-credit courses had become analytical, inorganic, organic, and physical chemistry. At the 300-level, the 3-credit course in industrial chemistry was retained, but everything else was repackaged into the 6-credit blocks inorganic, organic, physical, and geochemistry. Arguments were advanced to teach these 6-credit courses for the full academic, two semester year at two lectures per week. Experience had shown the chemists that this gave students optimum time to absorb the material, understand it, and then apply it. The laboratory components were set at 9 and 12 hours per week for ⅓rd (8 weeks) of the teaching year for the 200- and 300-level courses, respectively, which was quite inconvenient for the technical staff. The credit system allowed the flexibility that the Type B degree had aimed for and, one year later in 1982, the Type A/B degrees were abolished for commencing students. There was then a short respite from change. Chemistry discontinued the 300-level 3-credit *Industrial Chemistry* course in 1986 and instigated Chem 130, *Contemporary Chemistry* as '*An introduction to chemical principles by their application to selected topics of current interest*', a 6-credit second half-year course. It was a further attempt to increase student numbers and funding, but it had limited success. The next change came in 1990 when the analytical course (Chem 261) was replaced by Chem 265, *Chemistry, Technology and Management*; it ran for six years until 1996. The year of 1990 also saw another new 6-credit, 100-level offering, *Chemistry, Technology and Society* (Chem 131), that changed its content and name to *Chemistry, Life and the Environment* the following year, again attempting to provide a general interest course to attract students from non-chemistry and non-science disciplines. It continued to be offered beyond the turn of the century.


Rosine Haverkamp, First-year technician 1983-92; Senior/Chief Technician 1989-92, VUW-S19

There was further substantial change to the chemistry offerings in 1991. Firstly, long standing geochemistry was removed as, by then, the sub-discipline was firmly in the grip of Prof. Dick Walcott of geology, whose preference was for students to undertake courses in geophysics. Secondly, the three mainstream 6-credit courses at both the 200- and 300-level were reduced to two. These transformed into Chem 271/371, *Organic and Physical Chemistry* and Chem 272/372, *Inorganic and Physical Chemistry*, all with laboratory requirements of 6 and 9 hours per week over 12 weeks that reduced by one third the former exposure to the sub-disciplines. The *Chemistry, Technology and Management* courses at the 200- and 300-levels remained unchanged save for the lab requirement because Dr. Sally Davenport was evolving them. After two years with this format, the organic courses were expanded at the expense of physical and inorganic chemistry by taking Chem 271 and 371 in entirety. This was specifically to better suit the emerging biomedical sciences. Renamed as *Organic and Bioorganic Chemistry*, the 300-level course was then taught as such until the major changes of 2001. Chem 271 simply reverted to the more apt *Organic Chemistry* when courses were renumbered in 1996.

The first-year chemistry courses also saw change. As early as 1979, it had been recognized that many candidates did not have the essential prerequisites to enter a chemistry department at a university and so a short, one week laboratory-based course, named the *Chemistry Bridging Course*, was provided prior to the academic year starting. This course continued through the years and catered for up to 45 students. It transformed into *Introductory Chemistry* when the trimester system was introduced in 1996, and was then numbered Chem 191 and taught as a summer vacation course. It was described as '*An introduction to the basic concepts and laboratory skills required of students advancing in a chemically based science programme*' and was able to be credited to the BSc degree, but with safeguards to prevent misuse. In many ways this and its forerunner were the foundation of what is regarded now as *outreach* in chemistry This *Introductory Chemistry* programme has remained a component of the subject offerings in the SCPS even to 2012.

From the instigation of the University of New Zealand, regulations encouraged those students wishing to gain a qualification in a specialized discipline, taught only at one or two campuses, to take the first year of study at the college closest to home. Such students became known as *intermediate students* and their number increased in line with the number of professional specialist schools. At Victoria, there were 90 intermediate students among a first-year chemistry class of almost

265 in 1955. With medicine taught only at Otago University, a good part of the 1960s saw organic chemistry given greatest emphasis in the Victoria first-year course, but the number of lectures fell to close to 20 of the 72 by the mid-1970s. This was coupled with moves by the engineering faculties of Auckland and Canterbury Universities and the School of Architecture at Victoria to teach their own chemical course content and minimize that of the intermediate year. In similar manner, the Otago Medical School strove to have all the intermediate students with it and not elsewhere so as to maximize student numbers in Dunedin. It did this by making regular demands on course content, especially in organic and physical chemistry that became more and more difficult to accommodate in a general first-year chemistry programme. Thus, the number of intermediate students began to decline from the late 1960s thereby reducing the intake to chemistry courses at Victoria quite considerably.

The 1968 establishment of NZs second medical school in Auckland exacerbated matters as the majority of its intake came from the upper North Island. Entry at the second-year level from other NZ universities was thought disadvantageous, although candidates were selected for Auckland's second-year programme in medicine from 'intermediates' elsewhere. While the various disciplines sought to have the first-year intermediate students on their own campus, it was the changes in government policy and the disestablishment of the University Grants Committee in 1990 that forced major change. By 1993, it had become far too difficult to tinker continuously to meet the demand of the specialist schools so that a new 12-credit, 100-level course, *Chemistry for Health Science Intermediates* (Chem 190) emerged at Victoria. It ran for five years and was a further attempt to retain medical intermediate students in Wellington; Chem 190 never saw the numbers needed for it to be viable. But it was the governmental removal of the intermediate requirement that allowed open competition for students between the universities. The 'intermediate' year was out. What followed were major changes in the way the universities operated that saw open competition for students and the beginning of the managerial corporate business model of today.

The last significant change in the first century of chemistry at Victoria saw a university-wide move from credits to points for the undergraduate degrees. This was introduced to courses starting in 1998. In so far as Chemistry was concerned, there had been much debate about the workloads implicit in its credit-based courses when compared with those expected elsewhere in the faculty and the institution. The division into points allowed some rectification of this, but also it signalled the separation of laboratory work from the theory that it served to illustrate, something that happened in 2000. Thus, the BSc degree changed from the requirement of 102 credits to one of not less than 360 points in 1998. Of these points, at least 180 had to come from courses numbered 200-399 with no fewer than 120 of these from

courses numbered in the science statute. A minimum of 72 points were required to come from courses numbered 300-399 in the statute. Across the faculty, the course offerings ranged through points allocations of 11, 12, 15, 18, 22, 24 and 30. The Chemistry Department was able to offset the challenge of the discipline through the points it offered.

Chemistry saw the (by then) traditional, 6-credit, 100-level courses accorded 18 points each. At the 200-level, the 6-credit courses transposed to 22 points, while the 3-credit *Spectroscopic Methods* and *Analytical Chemistry* were one-half of this. The 6-credit 300-level offerings became 30 point courses. The millennium year structure change that divorced theory from its laboratory component gave rise to 18-point theory and 15-point laboratory programmes, but the 300-level options were changed again the following year to give 18 points for both the theory and laboratory components. Neither the credit system nor the points system was applied to the BSc (Honours) programme, and it remained with four written papers and a project report weighted equivalent to one paper until 2004 when points were introduced there also.

On opening its doors in 1899, the degree in chemistry was set as '*Honours*' but it was only able to be awarded after biology was being taught with the college degree then recognised by the University of New Zealand (UNZ). At that time, it required two written papers, theoretical and inorganic chemistry, and one of chemical techniques, organic or physical chemistry, together with laboratory study that was certified by the professor. An MSc with Honours – First, Second or Third Class – appeared in the UNZ calendar of 1905-06 to be completed in not less than one year after the BSc. Ultimately this became the postgraduate research degree and was gained by Philip Robertson in 1906. However, it was not formally adopted at Victoria until about 1922 when it became the accepted Honours qualification in the college. It equated to the former BSc with Honours qualification and was specified as such within the UNZ calendars. The two degrees had the same written examinations and practical requirements. Any person whose experience in his subject was deemed equivalent to the MSc with Honours was regarded as having met the requirements of the degree and, apparently, could apply for it as occurred routinely at Oxford University in the UK.

Having been introduced, and with a large number of MSc (Hons) graduates in Robertson's era, the MSc with Honours qualification remained in place as the normal advanced qualification in Chemistry until 1969. The experimental work was submitted as a written thesis and carried the weight of two papers. The thesis component was reduced to the equivalent of one paper in 1969 and then the BSc (Hons) degree in Chemistry was (re)instated the following year. It had become widely adopted elsewhere in the University. The formal 'Honours' had been reinstated in the UNZ calendar as BSc with Honours back in 1956. The change to

the chemistry offerings at Victoria in 1970 simply saw the BSc (Hons) and MSc (Hons) degrees differ in their requirements. The former dictated not more than one year and the latter not less than one year of study. The BSc (Hons) replaced the thesis of the MSc (Hons) with a research report that was given the weighting of one paper (20%), but it had the same four written papers prescribed. Students continued to take the masters course until 1976 when those in chemistry had to move to the BSc (Hons) structure. This was dictated by 1975 regulations that imposed two years of study for the MSc (Hons) degree. The research component of this degree was markedly increased with the weighting of three written papers.

From about 1970, the Chemistry Department was under increasing pressure because it took in honours candidates early in February to start their research work before the academic year formally started. It then taught the four-paper course over the academic year, examined it, and had its students continue with their research studies after the written examinations. Thesis submission had to be no later than February 28 of the following year. This satisfied the MSc (Hons) degree regulation of a one year period. It was felt by some members of the Science Faculty that Chemistry had higher expectations of its senior students than others, and that it placed them under more pressure than it should. Compliance became important and Frank Evison (Professor of Geophysics) led a move for Chemistry to comply, all in the cause of equality. The essential problem that focussed attention came from the December ranking exercise among honours candidates for the award of University Grants Committee postgraduate (PhD) scholarships. Although the better MSc student had his/her thesis submitted by late November, the Chemistry Department could only provide an estimated thesis result and overall grade for most. This had worked well for many years because supervisors had made critical analyses of their charges and submitted accurate 'estimates'. However, with new staff, the level of uncertainty increased and the Department was derided when, for one individual, the estimate differed markedly from the final result. Evison's moves, when coupled with a desire to have the MSc degree include more research work than was possible within one year, gave Chemistry no choice but to submit. It moved its prerequisite for its PhD degree to a BSc (Hons) from 1976 as was the norm across Victoria. The essentials of the BSc (Hons) in chemistry then remained unchanged for the remainder of the 20th century. Despite the evolution of the teaching programme, the graduates in chemistry continued to gain external recognition. The majority of its PhD graduates gained postdoctoral experience overseas with known academics in prestigious universities. Victoria's graduates were highly regarded.

The award of a higher doctorate for advanced study also dates to the earliest years of Victoria College. From 1899, the award of a DSc degree was possible not less than five years after the granting of a BSc. It was the normal 'advanced'

Carissa Jones, one of the last PhD students to work in the Easterfield Building, VUW-S19

degree beyond MSc until the PhD became available as discussed earlier. Although the University of New Zealand Roll of Graduates (1870-1961)[13] designates the college from which a DSc degree was awarded, it does not specify the subject area. Of the names that appear on the roll, the Victoria University Library electronic catalogue carries no corroborative entry for a chemist prior to 1959. Nonetheless, Edward Edinborough Chamberlain, the 1929 demonstrator under Robertson who gained his MSc that year (1928 submission), was granted a DSc degree by the UNZ in 1939. He was an expert in plant chemistry and plant diseases, a President of the NZ Microbiological Society, a Director of the Plant Diseases Division of DSIR, and the 1960 recipient of the RSNZ Hector Medal. It has to be assumed that his (higher) doctorate is in chemistry as Chamberlain held no formal qualification in botany.

The University of New Zealand bestowed its first honorary degree only in 1931 and that a DSc to Lord Rutherford of Nelson. From then until its demise, three Honorary DSc degrees were awarded to chemists and Victoria University has bestowed three since it gained independent status. The UNZ degrees were to James Conant, then President of Harvard University (1951), William Davies, Professor of Chemistry at the University of Melbourne (1956), and Sir Theodore Rigg (1957), then the recently retired Chairman of the Cawthron Institute and a 1911 MSc chemistry graduate of Victoria College under Easterfield. Victoria University bestowed DSc degrees upon its own College chemistry alumni, Professors Peter de la Mare (1983) and Alan MacDiarmid (1999), in its first century, and to Martin Banwell in 2010. Banwell is the first chemist so honoured by Victoria to have gained his PhD at the institution. He was Professor and Director of the Research School of Chemistry at the Australian National University in 2010. Peter de la Mare was an emeritus Professor of Chemistry who retired from the University of Auckland in 1981, while MacDiarmid was the Blanchard Professor at the University of Pennsylvania. This honour was bestowed a year before MacDiarmid became a joint recipient of the 2000 Nobel Prize in Chemistry. Although unstated at the time, the award of his Hon. DSc degree in 1999 served as a more than fitting way to open the second century of chemistry at Victoria.

Chapter Nine

Mayhem, Madness and Marvels

The evolution and growth of any Chemistry Department has to involve shortcomings, not only in its facilities, but also its staff and students and their practice of the profession. A synopsis of the more catastrophic events that caused concern to the university (and city) officials, few as they are, follow, together with a description of some less well executed experimental activities. Despite the failings, it is the staff and students from 1899 to the present time that have given the Department of Chemistry at Victoria the high reputation and standing that it holds within the international community of chemists. A synopsis appear under the composite *3M* title above.

Mayhem

The earliest record of a chemical catastrophe at Victoria comes from its first months of operation. The original chemical laboratory was housed in an upstairs room of the Victoria Street Technical School. There were no services on the upper floor for water, heating or gas. Water was carried up from the downstairs kitchen and the subsequent waste (solid and liquid) carried down.[1,3] There was no laboratory attendant and it was for the students to fetch the water and empty the slop buckets as required. It is recorded[1,3] that on one occasion this was forgotten *and that the corrosive slops ate through the bucket, ran through the ceiling and made an unwelcome mess in the director's office*. Given that the newly formed college

had only recently negotiated use of the Technical School space, one can but imagine the ire of the Director on entering his office the next morning, and the situation that Easterfield then found himself in.

The next records of incidents relate not to chemistry in the Hunter Building or the old Chemistry Building, though there must have been some, but to the early days of the Easterfield Building. The design and construction of the facility provided space for storage of the volatile organic solvents on the ground floor of the building. The space was in an unvented, internal room, located behind the chemicals store on the south-west corner of the building. In 1957 when the department took its occupation, and for some time afterwards, solvents were ordered and delivered in standard Winchesters. However, costs rose and it was soon decided that delivery of the common solvents (alcohol, ether and petroleum spirits) was to be in 44 gallon drums. It was in the isolated and enclosed room, with no ventilation, that the drums were stored and the Winchesters routinely filled from them. Two incidents involving this activity have come to light. In the earliest days, a laboratory assistant, Mr Brierely by name (employed for five years from 1959) was required to refill empty diethyl ether Winchesters, which he did in the enclosed Solvent Store. The situation became of concern when he almost self-anaesthetized; it seems that he was found in a rather dazed state in the ground floor corridor, having been able to extricate himself from the store.

The second incident was more serious. It seems to have been quite common for the offspring of staff members to spend time working in the Department during their school holidays. This was certainly true for John Burgess's children, Ian and Peter, and it was Ian who caused the practice to be terminated. He accepts responsibility for the first serious evacuation of the Easterfield Building. As told by Ian: '*When I was about 14 years old I was assisting by filling bottles in the solvents store and must have left a stopcock on a 44 gallon drum of acetone partly opened – I hotly denied it was me at the time but I don't think anyone believed me, and in hindsight they were probably right not to! Anyway, the net result was that the floor of the store ended up about ½ an inch deep in acetone. The Fire Brigade was called and most of the building was evacuated. It* (the acetone) *got into the storm water drains and the firemen spent the rest of the day flushing out the drainpipes all the way down Kelburn Parade*'. The archival records of the Department show that the spill was discovered at 11.30 am on Monday, May 17 in 1965, and that some 15 gallons of acetone had spilled – the official record put this down to a faulty stopcock that had been dripping through the weekend. The then registrar, Mr. L.O. Desborough, was asked to write to those who had assisted in the clean-up and the list of individuals provided included a 'Mr. Ian Burgess'. Although the last staff member's young offspring to work in the laboratories, he was by no means the last person to cause an evacuation of the building. The incident led to calls

for better ventilation in the store and the need for a separate, independent solvent store. The reports were submitted by James Duncan as Slater was on leave, and the matter was left ‘*until Professor Slater returns*’. The Easterfield storeroom was modified to carry dangerous goods in an isolated section at the front but it took several years before a separate facility was built in the Wai-te-Ata Road car park for solvent storage. Acids were always stored separately in an area adjacent to the internal goods elevator until the Wai-te-Ata solvent store was available when the freed-up space was given to the glassblower for storage purposes.

Two other events required intervention by the Fire Brigade. That with the greatest potential for serious damage was the fire of 1985. On Friday evening January 11 of that year the author of this account received a telephone call from the about-to-retire University Chancellor, Kevin O’Brien, to advise that there was smoke coming out of the Easterfield ground floor stores window, that the Fire Brigade had been called and that I, as emergency call-in chemist, should get there quickly. It proved to be a fire in the main chemicals store. No obvious blaze was evident but copious quantities of acrid smoke were billowing from the two windows. To the credit of the fire officers, no water was used and no one entered the area until the contents of the store had been provided to them. To retrieve these records required the emergency call-in chemist to enter the building via the rear entrance stairway, and retrieve the stock card index from the second floor inter-

Fire in the Chemicals Store, 11 January 1985, SCPS photo

nal store. After assessing the contents, entry was forced to the main store by the firemen and the fire extinguished. Those who had entered the building were then required to be decontaminated by showering in the middle of Kelburn Parade from a makeshift unit fed by mains pressure cold water, be wrapped in blankets and (eventually) allowed to go home; the clothes taken away by the fire service were deemed contaminated and disposed of! The cause of the fire was never established. What was found was that the fire likely started in from the door, in an area where no chemicals (or a combination of them) could reasonably be expected to have ignited. The actual cause remains a mystery, but there can be little doubt that the action of O'Brien, who lived close-by on Central Terrace, saved the day. The internal damage was from smoke and carbon deposition that infiltrated the whole of the ground floor and higher floors above the store. A feature of the building was its vertical service ducts that ran from bottom to top of the building and opened under benches or into cupboards at each level. The first-floor laboratory cupboards held Winchesters of flammable solvents which, fortuitously, did not fracture, otherwise the consequences would have been markedly more serious. The ducts were sealed rapidly at every level after the incident. It took several days for the acrid odour to fully disperse and the mess to be thoroughly cleaned up. The FT 80A NMR spectrometer, the most expensive piece of equipment and housed close-by in the south corridor, needed a complete wipe-down and comprehensive check by Alan Ross, but it survived with minimal damage.

The second and more serious event was clearly accidental. A flood was caused by rupture of the mains water riser at its U-bend on Level 6 of the building. It, too, happened on a weekend – this time a Saturday evening in 1988. Prior to about 1990 the city water supply was not exempt from the occasional small pebble passing through its pipes. The fact that the riser ended with a U-bend gave a surface for abrasion and after some thirty years, it became too thin to hold the pressure of the water. The impact of the full force of mains water gushing out and on to the floor of Level 6, the uppermost floor, caused a flood that exited by every available route (the ceilings and stairwell being the most obvious) to Level 5 ….. and onwards and downwards! By 1988, resident building caretakers had been dispensed with and it was some considerable time before the flood made its presence known by its outflow gushing down the entry level steps and out of the building on to Kelburn Parade. The impact of the numerous earthquakes that Wellington had suffered over the lifetime of the Easterfield Building left many small cracks and these gave easy egress to the water. It cascaded through many offices from above. Defects in the fitting of floor drains became apparent as, for example, that located on the second floor was at the highest point and just above the water level. The flood had a serious impact. Some lectures had to be relocated, the laboratories closed and cleaned up, and personal items retrieved and dried where possible. Almost every academic

lost his personal library or a substantial part of it, instruments had to be dried out, circuit boards chemically washed and, in many cases, serviced by the manufacturer's agents and/or replaced. The Varian NMR was out of service for several months because of irreparable damage to a number of circuit boards that were replaced but only after being built from scratch in the Varian (California) factory. Despite this the occupants and instruments of the Easterfield Building survived remarkably well with few items needing full replacement. At that time there was no automatic alarm system.

Madness

The presence of *chemistry* at Victoria is not without its academics and students alienating their neighbours with foul odours and a few explosions – just like every other chemistry department the world over. Up until the mid-1970s classical qualitative inorganic analyses formed a component of the introductory laboratory course and hydrogen sulfide (H_2S) was used in the traditional detection of heavy metals such as Pb(II) and Cu(II). H_2S is the poisonous gas that reeks of bad eggs (the Rotorua smell). The first-year laboratories were located on the first floor of the Easterfield Building that also carried the access-way from Kelburn Parade and the northern part of the campus into the university quadrangle and library. Use of the Kipp's Apparatus for H_2S generation during the lab programme invariably brought complaints from those in transit, neighbours on higher floors and those in the quad.

The small-ring hydrocarbon chemistry of Brian Halton also gained notoriety from odours that permeated the Easterfield Building. While the conjugated hydrocarbons, cyclopentadiene, benzene and cycloheptatriene have characteristic odours, several of the highly strained aromatic hydrocarbons that were made and used in his research had objectionable odours akin to the rotten eggs of H_2S, but orders of magnitude worse – the notorious cyclopropabenzene that he used can be detected nasally when present in about one part per billion. It was the syntheses and subsequent uses of these compounds that led to complaints. At the outset, when the odoriferous nature was not recognized, the smell permeated the building and most occupants retreated outside; there were two enforced evacuations. The first was when a previously unknown derivative was prepared that proved to be the most odoriferous compound ever made. The fume chamber and ducting failed to contain it; every occupant except Halton and Randall, a then PhD student, rapidly exited. The second was at the time the Chemistry Department was moving from Easterfield to Laby. An Honours student made a simple mistake: he forgot to destroy his smelly compound before washing out his equipment. By then the Psychology Department occupied the higher floors of Easterfield and one of the staff thought that there was a gas leak, called the fire brigade, and evacuated all but the chemists. When the brigade arrived they found those chemists still resident taking

tea in the second floor tea-room; there was no gas leak. What was worst about the Halton odours was that both the fume chamber ducting and the drains often failed to contain the smells. This led to frequent complaints from the photographers in their suite on the ground floor as the drains transversed their space. In similar vein, those on the higher levels, initially the geologists, then the geographers and lastly the psychologists, suffered from the same fate when ducting was adjacent. Every available precaution was used to minimize the impact, but as assessments at Heidelberg University showed no ill effects from this family of compounds save for mild alopecia, the research was never called into question.

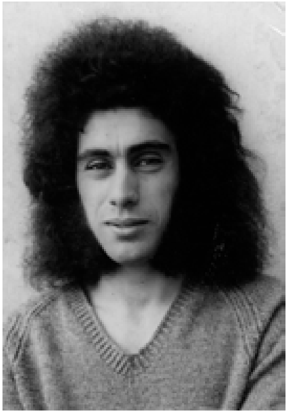
There were other incidents of chemists producing objectionable odours. The elegant safety laboratory that Slater had had constructed at the rear of the ground floor of the building, and adjacent to the ill-fated solvent store, was ducted directly into the university quadrangle. The fume cupboard in this safe lab was the one that had to be used for work with liquid ammonia. Whenever an experiment was concluded, the ammonia was allowed to boil off, rising directly into the quad, much to the distaste of those socializing or taking lunch. Finally, and apart from the occasional use of a thiol, a more consistent smell came from work carried out by Peter Northcote and a raft of temporary assistants. A student by the name of Andrew Rakich convinced Peter that there was a demand for an animal repellent to keep, for example, cats and dogs away from a property, and came up with the idea of manufacturing such a deterrent. Potentially most effective would be the mixture of thiols that make up the skunk odour, providing that they could be put into a gel and marketed. Of the thiols needed, three were commercially available at minimal cost, while the vital and most odoriferous component was the markedly more expensive (*E*)-2-butene-1-thiol (*E*-crotyl mercaptan). Victoria Link, the then commercial arm of the university, became enamoured by the idea and Peter Northcote set out to manufacture the vital element for the mix. Rakich, Isabella Pomer and a number of graduate students were employed as casual lab assistants to make the thiol in-house. A gel was blended off-site, tested and the final product mixture put on the market. It was found most efficacious and remains a commercial entity, though no longer with any synthetic connection to Victoria. Initially made in the Easterfield Building, the ‘skunk’ odour did little to enamour either the body of chemists or the other occupants (notably the psychologists) of the building. When the (new) School moved into the Laby Building at the end of 1999 the synthetic work moved with it, much to the ire of the physicists and, with the wind in the right direction, some of the then Facilities Management, now Campus Care staff, and residents of the city!

Despite this, it is the penchant of perchlorates to detonate that has given Victoria much notoriety. In the work performed by Neil Curtis the isolation of a perchlorate salt was, and remains, vital to the crystallization and subsequent structure analysis

of many of the azamacrocycles that he made and of which Victoria rightly boasts. Unfortunately, several of these salts have detonated during preparation and isolation, generally causing but a bang and minimal damage. It is Neil who has been quite incorrectly accused of creating what remains the most serious explosion, and that in 1967. What follows here is provided to rectify the unfair and unjust accusations that he received. A fume cupboard on the second floor of the Easterfield building (Room 214) was all but demolished and some 24 window panes facing Kelburn Parade were dispatched into the car park below, but as the accusations increased so did the distance travelled by the glass! *This major mishap was not of Neil's making*. Rather, it was caused by a student (or student assistant) who was working with Bob Hay, Lee Gallagher by name. It happened on Friday, February 24, 1967 and featured in the then Dominion newspaper the following day. As Neil recalled things, he said that he had often prepared ethylene diamine perchlorate $[(H_3N^+CH_2CH_2N^+H_3)\ (ClO_4^-)_2]$, but always on a scale of about 100 mg, at room temperature, followed by removal of excess solvent, also performed at room temperature. Gallagher chose to repeat the synthesis starting with about *one kilogram* of ethylenediamine and excess perchloric acid, left it under heat, and proceeded to leave the laboratory! The penchant for perchlorates to explode at elevated temperatures in concentrated form was confirmed by the major explosion that followed. Fortunately, the second floor Easterfield laboratory (legitimately used daily also as the honours class coffee room in those days) had emptied save for two regular occupants, Ken McNatty and Susan Parker. They were essentially uninjured in the explosion. Ken was furthest away from the fume chamber, but suffered lacerations to his face and was taken to hospital, to be discharged after treatment. Susan was closer to the source of the blast but escaped without a scratch. Both were severely shocked, the university authorities seriously shaken, and perchlorates placed under strict university regulation.

Neil acknowledges two explosions for which he takes responsibility. One was while carrying out research at the back (northern end) of the First Floor Inorganic Laboratory, the other when he had his office/lab in EA101. Both were perchlorate explosions, the first serious enough to break a couple of windows, the second a mere *pop*. Following the inquest into the major event of 1967, no staff member or student was permitted to synthesize any organic perchlorate or use perchloric acid or a perchlorate salt in an organic solvent without the written permission of the safety officer. The quantity of perchloric acid allowed out of the chemical store was strictly controlled, and the presence of it in any laboratory required that it be stored on a ceramic tile and not a wooden surface. There have been very few perchlorate explosions since and those that did occur were quite minor.

The occurrence of small fires was, and remains, a common occurrence in the chemistry laboratory. Few are of concern and easily extinguished, most often by


Dennis Steve Boolieris, MSc 1973, VUW-S19

a laboratory notebook. One such event, but at the more serious end of the scale, involved Dennis Boolieris. Dennis gained an MSc (Hons) degree in 1973 from carbohydrate research with Robin Ferrier. One afternoon, he discarded ether waste down the sink (the accepted norm those days) only to have a flash-back from hot water that had gone down the drain almost immediately beforehand. The impact of the flame was to ignite his large (afro-style) head of hair and the acrid odour permeated the second floor of Easterfield. So large was his head of hair that he suffered no other noticeable burns. A check-up in the student health service and transport home was all that was needed. The need to remove burnt hair demanded a haircut and when Dennis next entered the Department no one recognised him. Apparently he had not had cold water running in the sink as was required.

The Department's atomic absorption spectrometer also caused consternation. It was housed on the ground floor of the Easterfield Building as a part of the Analytical Facility. On one occasion the acetylene/oxygen flame was left burning overnight during which time the oxygen ran out. However, the acetylene gas continued to flow, kept burning and filled the room with a significant layer of soot. Fortunately the doors were closed and limited the damage to that space.

Finally, it seems that the engineering profession is not without an impact on chemistry. One of the successful commercial activities of Jim Johnston and his group was the wet-air oxidation of farmyard effluent. The project involved having effluent from farm shippons sent to Victoria, where it was subjected to aerial oxidation under wet conditions at high (*ca.* 300 ^{o}C) temperature. The objective was to provide a simple way of biodegrading the effluent to avoid pollution by the farming industry. The work succeeded but, in order to move into commercial operation, a successful pilot plant scale had to be tested. The pilot plant was designed, built, and set-up in the basement of the Laby Building. The original laboratory operation used a simple heater to provide the essential high temperature. The engineering consultants did not up-scale the 1.5 kW heating core of the lab apparatus to the pilot plant. The subsequent switch-on in Laby gave a real, but trivial temperature rise. Significant modifications were needed in order to provide a viable pilot plant!

Marvels

The esteem in which a department is held is no better than the kudos gained by its individual staff members. When combined with research expertise built up


Rob Keyzers, ca. 1998 VUW-S19

over many years, this culminates in a department becoming recognised for its activity in a particular area. Few institutions are classified as ivy clad but many have staff within their hallowed halls that carry international laurels. The reputation that the Chemistry Department at Victoria University of Wellington holds is dominated by individuals, although the area of physical organic chemistry was accredited in the past and organometallic chemistry is now at the forefront.

The reputation for physical organic chemistry was gained by P.W. Robertson and his kinetic (halogenation) studies that started in 1920. Initially this area was as much physical chemistry as it was organic and is illustrated by the appointment of the late Brian England to a position in physical chemistry. Yet his studies of the rates and nature of organic reactions, when coupled with those of Bob Hay on metal ion catalysis, served to set Victoria as the recognized NZ centre for physical organic chemistry. This stayed for several years even after Victoria graduate, Peter de la Mare, returned to head Auckland University's Chemistry Department in 1960. Nonetheless, physical organic chemistry continued into the 21st century through Brian Halton, and his all-encompassing studies of strained organic molecules dominated by a three-membered ring motif. His work provided much international collaboration that provided not only him but the institution with significant recognition.

Natural products organic chemistry was started in Wellington by Easterfield with his pioneering experiments at the Victoria Street Technical School. His reputation, nationally and internationally, came from him being the most prolific publisher of research among the NZ professors of chemistry at the time. Sadly, however, the foundation in natural products chemistry that he laid was dormant for half a century after he left until Robin Ferrier revived it and brought to the fore with his extensive work in the field of carbohydrates over his 27 year tenure. It had been hoped that Slater and (Ted) Harvey would evolve natural products organic chemistry in Wellington. However, Harvey, though excellent at the bench, never settled to academic publishing and overseeing a research group, while Slater became enamoured with administrative matters following the design and construction of the Easterfield Building; he never gained a strong scientific reputation. In contrast, Ferrier lived and breathed carbohydrate chemistry. He was convinced that only through its study could NZ natural products chemistry reach maturity. He

held the view that his area was the one that held the key to a nationally recognized pharmaceutical-based chemicals industry, but in this he has not been proved correct. It was his legacy that provided the staff who have led to the recognition that the Carbohydrate Chemistry Group at Industrial Research Limited holds. What remains to be seen is whether the loosely bound 21st century concentration of natural products (and analogues) syntheses of Joanne Harvey (a 2004 appointee), the synthetic drug-targeted improvement and delivery work of Timmer and Stocker (2008 appointees), the aromas chemistry of Keyzers (2009 appointee), and the on-going marine natural products identification and utilization of Peter Northcote (1993 appointee) will lead to more widespread recognition of the area.

Recognition of Victoria for organometallic chemistry is entirely due to the life-long work of Neil Curtis. His pioneering studies of azamacrocycles began with a 1961 paper on Schiff-base complexes (of divalent nickel and copper), the forerunner of more than 160 peer reviewed international publications. It is this, more than anything, which has placed chemistry at Victoria University of Wellington on the international map. In his early days, Curtis had collaborative overlap with Bob Hay (three joint publications over 1966-76 and one in 1986), but it is from Neil's own studies that easy syntheses and the structures and properties of a raft of azamacrocycles became internationally accepted and utilized. His first azamacrocycles preceded the synthesis of the analogous polyethers of Charles Pedersen that led, with Donald Cram and Jean-Marie Lehn, to the 1987 Nobel Prize for *the development and use of molecules with structure-specific interactions of high selectivity*. The three Nobel Laureates were credited with laying the foundation of what today is one of the most expansive chemical research areas. Cram coined the term host-guest chemistry and Lehn termed it supramolecular chemistry. The nitrogen macrocycle is equally as important as the Nobel-awarded research, and this lies at the feet of Neil Curtis and the door of Victoria's Chemistry Department. In the same way that the work of the three Nobel Laureates has been of enormous importance in the development of modern chemistry, Neil's studies played a pivotal role in co-ordination chemistry, organic synthesis, analytical chemistry, bioinorganic, and bioorganic chemistry. A proportion of the Curtis legacy was performed collaboratively. Thus, the expertise of David Weatherburn and Olga Gladkikh with crystal structure analyses led to them having fourteen and fifteen publications with Neil, respectively, of which only two of the twenty-nine are co-authored by the three of them. In the same vein, Neil provided some 19 papers with Joyce and Neil Waters in about equal proportions.

The other player in the inorganic arena at Victoria is applied chemistry. The researches of Monro and Martin on NZ ironsands in the old Chemistry Building were more than significant in the ultimate decision to develop the steel industry. James Duncan instigated projects that encompassed a range of NZ industries; however,

it is the work of Jim Johnston that gave national recognition to Victoria as a centre for applied chemistry. While the chemical detail of many of the projects carries less challenge than the academic research of the (now) SCPS, it is the technological advances and industrial significance of the work that gives his studies their impetus. From his early inorganic and geochemical studies, Johnston developed an ever-increasing international reputation for fundamentally applied studies that he has taken to the pilot plant and beyond. Not least among these is the extraction of titanium dioxide from NZ ironsands using hydrochloric acid. Initially, this was for Grampian Mining, later to become Fletcher Titanium Products, but it evolved into use in the paint industries with a patented outcome by the US Company, Sherwin Williams. The wet air oxidation of farmyard effluent (bio-waste) solved some agricultural pollution issues and was then adapted for use in the removal of other industrial effluent, *e.g.* in the pulp and paper industry. High quality silica-impregnated papers for the print industry, silica removal from geothermal waters, nano-structured calcium silicate absorbents for industrial waste, and improved liners for packaging also provided impact. Colour-tuneable quantum dot ink-jet printing led to another patented outcome. Most recently, a concerted effort has led to nano-silver and gold-impregnated merino wool for the fashion industry under the general title of *multifunctional textile products with composite materials*. Future recognition in the applied arena remains with Johnston, though the nanoparticle and quantum dot studies of Tilley (a 2008 appointee) will impact. The academic environment falls to the continuing catalysis studies of Spencer using organometallics that will be enhanced by Martyn Coles (a 2012 appointee) developing main group compound catalysts, all augmented by the theoretical computational work of Matthias Lein (a 2010 appointee).

In comparison with the above, Victoria's physical chemists have been given little international recognition. It is more from its students forging careers overseas, and its staff members that followed them, that Victoria is known (see Appendix V). PhD graduate Mike McKubre (PhD 1976) gained international recognition from his cold fusion work at SRI, an independent, non-profit research institute in California and he was joined by former staff member Dr Stuart Smedley. Robin Speedy and his PhD student Richard Bowles (PhD 1997; now of the University of Saskatchewan) continue physical and theoretical studies of hard spheres, though no longer associated with Victoria. Jeff Tallon (PhD 1976 and Distinguished IRL scientist), Douglas MacFarlane (BSc Hons. 1978; Professor of Physical Chemistry, Monash University) and Bryce Williamson (BSc Hons 1981; Professor of Physical Chemistry, Canterbury University) clearly are distinguished physical chemists but to claim that their education at Victoria is what has given rise to their status would be akin to Australia claiming that Phar Lap is an Australian horse. Thus, it falls to Prof. Kate McGrath (a 2004 appointee at the Senior Lecturer level, and

now Professor and Director of the MacDiarmid Institute), Justin Hodgkiss (a 2011 appointee) and Nicola Gaston (a very recent 2012 incumbent) to gain the recognition that physical chemistry needs. Whether the disparate research of McGrath's studies on the self-assembly of biominerals, Hodgkiss's photophysical studies of organic semiconductors or the computational chemistry of Gaston that encompasses the materials science area will give this, either alone or in combination with the new arrival, or whether it has to be through interaction with the physicists and the MacDiarmid Institute, remains for the future.

Chapter Ten

Retrench, Regroup, and Revive: The Second Century Awaits

The discussion has focussed on the evolution of Chemistry at Victoria through its first century of operation, the 20th century. However, it was in the last decade of that century that the face of science in New Zealand changed and that of chemistry at Victoria was irrevocably altered.

The way in which research was funded in the NZ universities had been through the University Grants Committee. From the late 1980s and early 1990s, the winds of change blew down the hallowed halls of the New Zealand universities. The first structural change was the demise of the UGC Postgraduate Scholarships scheme that demanded each institution fund its own postgraduate students. The impact upon the Chemistry Department at Victoria was significant. A good number of scholarship candidates with First Class and good Upper Second Class honours degrees left for other NZ or overseas universities, Otago being the favoured local choice as monies were available there. Victoria's funds were minimal. Initially, the limited monies were dispensed from a university-wide selection process that encompassed every discipline and sought to encourage active research in areas previously under-represented. Much the same happened also for postdoctoral students. It was Simon Upton, the Minister of Research, Science and Technology in the National Government of the day, who led the move to a competitive funding model for dispersion of research monies. The aim was, and is, to gain more value from government investment.

Thus, Upton had the Crown Research Institutes established in 1992 with significant components of their budgets won from competitive bidding to the Ministry of Research, Science and Technology innovation fund. This led to the academic arm of research being less well funded than previously. A call from university and a number of government scientists for a separate allocation for fundamental research gathered momentum. This became recognised by Upton in terms of '*Blue Skies Research*' and, after much debate, the Marsden Fund was established in 1994. So grateful were the NZ scientists that Upton became the only non-scientist elected to Fellowship of the Royal Society of NZ, and that in 1998. The Marsden Fund, ostensibly for fundamental, basic, or blue-skies research, saw its early period marked by becoming more focussed in the nature of its awards. Chemistry suffered to the extent that only about 5% of the available monies were and are directed to the subject. No grant was made to any Victoria chemist prior to the new millennium in 2000, although Halton had a proposal proceed to the second round assessment in 1999, a first for the subject at Victoria. The dictates of the day saw much of the available Marsden money being awarded for study in areas thought more likely to have subsequent commercial spin-off – fundamental but not basic research. The funding of genuinely basic science enquiry 'because the answer was not known' became rare.

The opening of the 1990s decade foreshadowed the first retirements of serving chemists since that of Bobbie Monro in 1959. The first to go were John Tomlinson and John Craig, both formally leaving the Department at the end of January 1991 having reached the mandatory retirement age. They were followed by Neil Curtis and Robin Ferrier at the end of January in 1996 and 1998, respectively. The Chair of Physical Chemistry was disestablished on John's departure leaving physical chemistry with just two academics, Jim Pearce and Robin Speedy. Ferrier had foreshadowed John Craig's retirement to the extent that, after strenuous argument, a replacement for him was approved before he left. However, it was as a half-time, limited-term, three-year lectureship, which Christina Chai accepted and the organic area was then at 2.5 staff members from John's departure - Christina was supposed to be 50% at DSIR Chemistry. The inorganic area was served by Burns, Weatherburn, Johnston, and Curtis giving the Chemistry Department a total of 8.5 academic staff but when Neil left the Chair of Inorganic Chemistry was also disestablished.

During 1991, and despite the poor numbers, the Department gained approval for two new staff members. One was Dr. Sally Davenport, a former PhD student with the Burns group, but her lectureship was a joint appointment with the Commerce Faculty. It was made with a view to forging the commercialization of science, strengthening staff-student linkages and improving undergraduate numbers. Simultaneously, the physical area received Dr. Rod Tilbury, a graduate of the Uni-

versity of Western Australia, to restore it to three academic staff. Sally Davenport stayed with chemistry for some six years until 1998 when she moved permanently to the business area and (subsequently) a chair in the Faculty of Commerce and Administration. She was never a force in Chemistry as her office was located down Kelburn Parade with the Commerce Department. With the passage of time, her commerce interests strengthened while those with chemistry weakened. Tilbury stayed until 2000 (see below).

In 1995, Gary Burns became another academic to be lured to the central administration. He accepted appointment to a three-year term as part-time Assistant Vice-Chancellor (Academic). As was normal, his commitment to the administration was well in excess of the 50% allocation of his time but it did give the Department another three-year, limited-term lectureship, this time in inorganic chemistry to cover for him and the loss of Neil Curtis on his retirement. Russian immigrant Olga Gladkikh, was appointed and was in the Department from the beginning of the 1995 academic year. Her post ran its term, but it was not extended on Burns' return to the Department, even though the AVC role had secured him a one year sabbatical in 1998. Olga was out of a job.

The retirement of Neil Curtis in January of 1996 saw Chemistry at Victoria without an established Chair in Chemistry. Robin Ferrier's position in organic was to a chair, but not a formally established one, and Halton had been appointed to a personal chair in 1991. The situation demanded an established senior position and this met with the approval of the senior administration. John Spencer was successful from among the applicants in that year of 1995 and was appointed Professor of Chemistry. He took up his position in 1996 and moved into the Chairmanship of the Department later that year.

Christina Chai served her limited term appointment, but accepted a lectureship in chemistry (organic) at the Australian National University in early 1994 rather than taking appointment at VUW to what became a permanent full-time lectureship. The reinstated position was filled by Dr. Peter Northcote, who established marine natural products chemistry at Victoria. By the time Neil Curtis retired, physical chemist Robin Speedy had become independently wealthy to the extent that he submitted his resignation during 1995, left, and carried out research under the competitive funding regime then in place as a single researcher working from a home base. Thus, from early 1996, physical chemistry was staffed by P.J. Pearce and R.N. Tilbury.

Student numbers at the undergraduate level remained low and those proceeding to the honours level remained comparatively steady, but few. Fewer returned for a PhD because of the continued lack of funding. The Chemistry Department underwent a second external review in early November 1993, by then a regular Vic-

toria event performed by NZ and overseas assessors. Instigated in the 1980s, the first assessment of Chemistry supported an independent department, even though the academic staff were of the view that amalgamations would be beneficial. The organic group swayed towards a merger with the biological sciences while the majority favoured one with Physics. The review of 1993 found the academics less enamoured with the prospects of amalgamation and an independent department was reaffirmed by the panel. There were inevitable recommendations on the teaching and research fronts, but the consensus was for the department to continue. Not too long afterwards, there was a move within Victoria to establish a '*Rutherford Institute*' with Victoria's Dean of Science (John Wells) a staunch advocate. The idea was for a more applied, materials science entity and it gained support over the next years. The Dean's view was that Chemistry and Physics should move off the Victoria Kelburn campus and relocate with Industrial Research Limited (as DSIR–Chemistry had become) at Gracefield, forming the new Institute there. Not surprisingly, the Crown Research Institute found this prospect attractive as it meant a guaranteed supply of PhD students on the campus. With an increased number of active scientists at the one site, economies of scale and combined instrument costs made good sense. However, the prospect of commuting 37 km to and from (or from and to) Gracefield to provide the undergraduate lectures and laboratory programmes at Kelburn did not enamour the Victoria academics.

And so it was that the morale within Chemistry fell further, along with the decreasing undergraduate and postgraduate student numbers. The PhD degrees awarded over the 1995-1999 period numbered just ten, less than a half of the 22 of the 1985-89 period. However, fate was on the side of Chemistry as the Rutherford Institute never got off the ground despite a Chair in Materials Science being advertised. Nonetheless, the independence of the Chemistry Department was severely dented – its continued existence was under a cloud of bureaucratic expediency.

With the number of chemistry academic staff just ten and declining, and student numbers remaining low, it was in 1997 that the Dean was decisive in arguing for Physics and Chemistry to merge and create a unit of meaningful size. Amalgamation was decreed. Neither the incumbent Chairman of Chemistry nor of Physics was prepared to take on the responsibility of establishing a new school – to be named The School of Chemical and Physical Sciences (SCPS). A nomination process led to Dr. Jim Johnston becoming the inaugural School Chairman for a three-year term from August 1997, and this was renewed (without the formally required consultation process) for a further term. The existence of a Department of Chemistry at Victoria University of Wellington ended in August 1997.

As noted earlier, the Chemistry Department was never well endowed over its first 100 years of existence. It was the philanthropy of Gerry Gordon, a former Neil Curtis MSc student that led to the Curtis-Gordon Research Scholarships in

Victoria's Varian Unity 300 MHz NMR, VUW-S 19

Chemistry from 1997. Given the situation that the Chemistry Department was in at that time, it was these scholarships that provided the wherewithal to keep research active and to provide some welcome respite for the staff. Despite all the upheaval, the existence of the scholarships supplemented arguments for a third generation NMR spectrometer. The approaches to the then Vice-Chancellor, Professor Les Holborow, succeeded in mid-1997. A sum close to $750,000 was provided from the central coffers for the purchase, then the most expensive piece of equipment purchased by Victoria. A new instrument, a 300 MHz multinuclear unit with superconducting magnet, the first such at Victoria, was ordered from Varian Associates. It was delivered after establishment of the SCPS and located in late 1997, not in Easterfield, but in the Laby Building at the southern end of the run of Kelburn campus structures, where it remains. The presence of the 'supercon' in Laby denoted formal cohabitation, but the nature of the physics and chemistry groups remained disparate as the staff remained in separate locations, Chemistry in Easterfield and Physics in Laby. Robin Ferrier's retirement occurred shortly after the new NMR was gaining serious usage at the end of January in 1998. He has the (dubious) honour of being the first chemist to leave the School of Chemical and Physical Sciences. As there was no replacement for him, Northcote and Halton carried the organic area and its 210 lectures alone, but by the mid-year semester break, a lectureship in chemistry for the organic area was agreed to, advertised, and John Hoberg appointed to it. He arrived late in November of that year.

Although there were attempts to unify the chemists in Easterfield with the physicists in Laby, it was only an urgency to renovate the 40-year old facilities in the Easterfield Building to meet ever increasing Health and Safety and Earthquake requirements that brought matters to a head. A decision was made to revamp and extend space in the Laby Building, and relocate the chemistry operation from its home of 40 years to join the physicists. Only after this did the new School see the beginnings of a cohesion that has served it, its staff, and its reputation well for more than twelve years now. The expansion and reorganization of the Laby Building became the millennium project for science at Victoria. Thus, Laby expanded slightly to the south, existing space was revamped and teaching and research laboratories were created for chemistry. A small store was also included, all ready for occupation before teaching in 2000. Jim Johnston took upon himself the roles

that Easterfield, Robertson and Slater had had before him, namely that of liaising with the architect and builders and setting the laboratory design. But by 1998, the administrative arm of the university was more than long enough to ensure he remained a practising chemist. Upon relocating to the Laby Building in late 1999 and early 2000, chemistry contracted into about 60% of the space it had been accustomed to. No longer were there teaching laboratories for each sub-discipline but now a wet 'synthesis' lab, a 'dry' measurements lab, and an independent area for 'Introductory' practical work. The space was insufficient and the 'dry' area soon became 'wet'. The enactment of more regulated laboratory standards by government was followed by a need for almost all synthetic work to be performed in a fume cupboard. Further alterations were enforced early in the millennium that increased the number of fume chambers, but the chemical store contracted to provide an additional research laboratory. Expansion came through the 2009 construction of the Alan MacDiarmid Building and its occupation in 2010.

While the departure of chemistry from Easterfield had been decreed on creation of the SCPS, the mood in the Department was far from good; student numbers were still low. The first professional Dean of Science, German national Peter Englert, a mass spectrometrist formerly employed by the Institute of Geological and Nuclear Sciences, placed much of science under review in late 1999. He had joined Victoria University in 1998, been involved in the space allocations and internal design for the Laby modifications, and was viewed as doing little other than alienating his faculty in just about everything he did. It was in about September of 1999 that he instigated a management-driven review aimed at downsizing not

The Alan MacDiarmid Building at Victoria University of Wellington, courtesy of VUW Image Services

just the physics-chemistry operation but that of the entire faculty. By November of that year all staff had been 'invited' to reapply for their positions and voluntary redundancies sought. In SCPS, about one-third of the technical staff left, some voluntarily, others so directed – and the administrative arm of the new School was not spared either. Of the chemistry academics, Rod Tilbury and Gary Burns both accepted voluntary redundancy; Rod returned to Western Australia while Gary moved to the Blenheim area to grow figs. Jim Pearce became the sole physical chemist following this restructuring.

Despite the downsizing, the amalgamation of two disciplines as the SCPS had major benefits. Alan MacDiarmid, Bobbie Monro's lab boy, was awarded a share of the 2000 Nobel Prize in Chemistry, a boost greater than anyone could have envisaged. Course requirements for what had emerged as health sciences were relaxed, so that these students could undertake more advanced chemistry programmes and proceed to PhD study. This gave more research opportunities for the organic chemists and collaborations with the life scientists began to blossom. The establishment by government of six Centres of Research Excellence in 2002 led to one in materials science that was located in the Laby Building. Its presence was the brainchild of the late Professor Sir Paul Callaghan, who had been appointed to Physics in 2001. He became the inaugural Director of the VUW-based Centre of Research Excellence for Advanced Materials and Nanotechnology, the *MacDiarmid Institute*. The institute has allowed for physical and materials chemistry to grow and generate positive interactions with the physicists. Subsequently, in 2004, the Malaghan Institute of Medical Research relocated to Victoria's Kelburn campus in a purpose-built facility adjacent to the SCPS. Its presence has offered further research opportunities to the synthetic organic and materials science chemists and joint appointments.

Although serious research can be performed now only by gaining external funding competitively, the disciplines of chemistry and physics have survived the trauma and trepidation of the late 1990s, have more secure funding, more staff members, markedly more research and undergraduate students, and are revived. The start of Chemistry's second century at Victoria saw an alumnus gain a Nobel Prize and, in 2010, a building named after him. Thus, the School of Chemical and Physical Sciences, with its inextricable links to the MacDiarmid Institute and the Malaghan Institute, is in its infancy. It remains for a future scribe to record its successes and failures after the passage of an appropriate period of time.

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Appendices

Appendix I Chemistry Academic Staff 1899-1999[a]

	Chemistry		
	Thomas H. Easterfield **University Foundation Professor in Chemistry**[b] **(Organic) 1899-1919**		
	Philip W. Robertson **Professor of Chemistry** **(Organic) 1920-1949**[c]		
Mr A.D. Monro 1929-1959 (L-SL-AP)[d,e]		Dr Walter S. Metcalf 1946-1954 (L-SL)	
	Prof Stanley N. Slater **Professor of Chemistry** **(Organic) 1950-1968**		

Inorganic Chemistry	*Organic Chemistry*	*Physical Chemistry*	*Biochemistry*
Mr W. E. (Bunt) Dasent 1954-1967, 1972 (L-S-L-R)[e] Former JL and student of Robertson	William E. Harvey 1953-1979 (L-SL-R-AP)	R.M.R. Milburn (Temp. 1954) R. Hodges (Temp. 1956)	
Neil F. Curtis 1957-1995 (L-SL-AP) ***Professor 1971-1995***	R. Basil Johns 1955 (Oct)-1959 (L)	Brian D. England 1955 (Oct)-1968 (SL-R)	Richard Truscoe 1957-1962(L)
	G. Sleeman (Temp. 1959) A.D. Ward (Temp. 1960-1961)	R. Archibald Matheson 1958-1970 (L-SL)	M.H. Briggs 1959-1962 (L) (SL in Pedology June 1962)
		W. Segal 1960-1963 (L)	
James F. Duncan ***Professor of Inorganic & Theoretical Chemistry*** ***1962-1986***	John T. Craig 1962-1990 (L-SL) Robert W. Hay 1962-1971 (L-SL-R)		F.J. Darby 1963-1966 (L)
R. G. Burns 1964-1967 (L) (Geochemistry)	Malcolm D. Carr 1964-1969 (L-SL) (Organic/ Chem. Educ.)		***John N. Smith*** ***Professor of Biochemistry*** ***1964-1984***
Alan G. Freeman 1964-1985 (L-SL)		Edward P.A. Sullivan 1965-1971 (L-SL-R)	
Marcia F. Bailey (Temp L) 1967		***John W. Tomlinson*** ***Professor of Physical Chemistry*** ***1966-1990***	Alan G. Clark 1967-2009 (L-SL-R/AP)
Gary R. Burns 1968-2000 (L-SL-R)	Brian Halton 1968-2004 (L-SL-R) ***Professor 1991-2004***[f]	Allan F.M. Barton 1968-1972 (L-SL)	***Biochemistry* became independent in 1969**
Alan M. Taylor 1968-1981 (SL) (Geochemistry)		Martin Viney 1968-1969 (L)	
		Ekardt Sinn 1969-1972 (SL)	

	Robert (Robin) J. Ferrier ***Professor of Organic Chemistry*** ***1971-1997***	Nigel J.R. Field 1970-1972 (L)	
Hank Keiz(s)er 1972-1973 (R)		Stuart I. Smedley 1970-1988 (L-SL-R)	
David C. Weatherburn 1973-2009 (L-SL)		Digby MacDonald 1973-1974 (L)	
James H. Johnston 1975-201- (L-SL-R-AP) ***Professor 2003-201-***		P. James Pearce 1973-2008 (L-SL)	
		Robin J. Speedy 1976-1995 (L-R)	
Sally J. Davenport 1992-1998 (L-SL)	Christina L.L. Chai 1991-1993 (3yr-L)	Rodney N. Tilbury 1996-2000 (L-SL)	
Olga P. Gladkikh 1995-1997 (3yr-L)	Peter T. Northcote 1994-201-(L-SL-AP)		
John L. Spencer **Professor of Chemistry** **1996-201-**	John O. Hoberg 1999-2003 (L-SL)		

[a]Those appointed as Professor or appointed to a personal chair appear emboldened.
[b]All professors were appointed to *emeritus* status on retiring.
[c]Retirement was formally on the 31st of January in the following year.
[d]Assistant and Demonstrator, 1921-28.
[e]L: Lecturer; SL: Senior Lecturer; R: Reader; AP: Associate Professor
[f]Retired on March 31, 2004.

Appendix II Assistants, Demonstrators & Junior Lecturers

Demonstrators, Assistants and Junior Lecturers (JL) 1929-1985

The permanent position of Assistant was created in 1920 and the independent position of Demonstrator was created from 1929

Easterfield era Assistants & Demonstrators

Assistant: J. Bee (1906); R.E. Rudman[a] (1907).

Assistant & Demonstrator: F.R.Lankshear (1908-10); J.C. McDowall (1911-14);
F. Stukey (1911); B.B. Low (temp; 1912); R.M. Bruce (1916-19);[b] G. Bagley (1918-20).[c]

Robertson era Demonstrators

1921-1926 & 1927-28	Mr A.D. (Bobie) Monro[d]
1923	H.L. Richardson (MSc 1924)
1927	Dr. J. Sword
1929	E.E.Chamberlain (MSc 1929, DSc 1939)
1930-1931	C.A. Steele (BSc 1931)
1932-1933	W.K. McGavin (MSc 1933)
1934	J.A.D. Nash (MSc 1934)
1935	*vacant*
1936	N.T. Clare (MSc 1935)
1937-1940	E.P. White (MSc 1938)
1942	P.A.Ongley (MSc 1941)
1943	I.D. Matson
1944-1945	B.E. Swedlund (BSc 1943; MSc 1945), H.D.C. Waters (MSc 1946; temp. assistant)
1946-1947	B.E. Swedlund MSc (*Junior Lecturer*) (JL), H.D.C. Waters (asst.)
1948	B.E. Swedlund & A.R. Caverhill (MSc 1947) (JLs), H.D.C. Waters (asst.)
1949	B.E. Swedlund, A.R. Caverhill & H.D.C. Waters (JLs), A.G. MacDiarmid (MSc 1950) (Demonstrator)

Slater era Demonstrators and Junior Lecturers

1950	B.E. Swedlund, A.R. Caverhill & H.D.C. Waters,[e] A.G. MacDiarmid (Demonstrator)

Inorganic	*Organic*	*Physical*	*Biochemistry*
	B.E. Swedlund MSc, 1951-52		
W.E. Dasent MSc 1952-54	R.M. Milburn MSc, 1952 (D'strator)	T.A. Turney MSc, 1952-54	

	C.D. Mitchell BSc 1954 (D'strator)	E. Wong 1953	G.S. Peterson 1954 (D'strator)
	R.A. Bell 1956-58 (D'strator)	M.D. Carr 1957-59 (D'strator)	R.G. Burns (1959)
D.A. House 1961-63		I.R. Alet 1961-62	
R.G.D. Dolby 1962-64 G.R. Burns 1962-65			
P.O. Whimp 1964-68			
P.C. Rankin 1964-66 Mrs. Y. Curtis (part-time 1965)	L.J. Porter 1965-67		
K.R. Tate 1965-68 Marcia F. Bailey (temp) 1966	P.J. Morris (1965-67) (Asst Rad Safety)		
A.G. Langdon 1967-68 (Asst Rad Safety)	L. Main 1967-68		A.G. Clark, G.E.R. Hook 1967
D.J. Stewart 1968 D.J. Cook 1968-72			
K.W. Perrott 1969-71 (Asst Rad Safety)		T.S. Clarkson 1967-70	
J.H. Johnston 1970-74	A.R. Browne 1972-76 (Asst Rad Safety)		
J.W.L. Martin 1973-76	R.H. Furneaux 1976-1978	M.C.H. McKubre 1973-76	
P. Kyle 1976		Christine M. Burden 1977	
	D.L. Officer 1979-84	B.D. Cornish 1981-82	
C.M. Cardile 1984-85	Dr P.C. Tyler part-1983	S.J. Henderson 1983	

[a]The name is spelled with an '*i*' in the College Calendar but with a '*u*' in the NZU List of Graduates and the Council minutes reported in the Evening Post. [b]His appointment post-dated the first in Physics by two years; he is one the VUC war dead from 1918-19 active service. [c]His appointment was temporary [d]First chemistry lecturer, 1929-1959. [e]Non-designated individuals from 1950 are Junior Lecturers.

Appendix III *Chemistry Support Staff: 1955-1999*[a,b]

Head Technicians

R. (Bob) Barbour (1951-70)

John F. Burgess Lab Steward (1957-71); Head Technician (1971-77); moved to Teaching Aids (1978-83)

R.J. (Ray) Page (1970)

Mrs. Rosine Haverkamp (Senior Tech. 1989-90; Chief Tech. 1991-92)

Gordon George (Phys, TOb 1993-94)

Dr. Gordon Heeley (1994-201-; TO 1995-97, STO 1998-201-)

Technicians

R. Tregurtha (1956-58)

Russell J. Woods (IR/Phys Chem ½time each 1962-65)

Miss V. Graham (Temp. Biochem, 1962)

Miss N.S. Harvey (Temp. 1962)

J.C. Blackett (1963-65)

J.H. Torrens (1963)

Mrs. A. Williams (neé: Geeland, Biochem; 1963-64)

Mrs. A. Binnings (Biochem, 1964)

Mrs. Yvonne Curtis (1964)

A.F. Mess (1964-66)

George A. Holley (Biochem, 1965-2000)

R.J. Clarke (1966)

R. Gledhill; 1966)

Mrs Helen Harvey (1966-68)

Miss L. Smith (1967)

C.M. Schipper (Biochem, TO, 1968-69)

Stage I Laboratory

Mrs. Iivi Turner (1960)

Eric Stevens (1963-67)

Eddie Hollingsworth (1966-73)

Mrs. Jean Burgess (1973-83; TO 1983)

Mrs. Rosine Haverkamp (1983-92)

Mrs. Isabella Pomer (part-time; 1989-90)

Mrs. Jackie King (1994-95 + Phys Chem)

Inorganic Chemistry

Eric Stevens (1968-83; TO 1983)

S. McConnel (Mössbauer)

Les Singh (dates unknown)

Mrs. Christine Harper (Geochem/Anal) (1984-87)

Miss K.G. Ng (dates unknown)

Manfred Schefer (Anal Facility, 1976-78; killed in an aircraft accident, 11 Mar 1978)

Mrs. Sheila Bowden (ca. 1978-94)

Ms. Ann Jaggard (1990-92)

Ms. Teresa Gen (Phys/Inorg/Org, 1993-201-)

Ms. Sonia Duffy (1988)

Mrs. J. Radley (mid-1988-89)

Ms. Karen Lunly (ca. 1989)

Rosalind (family name/dates unknown)

Organic Chemistry

Colin Bleasdale (1967-71)

Mrs. Regine Blattner (1972-82)

Mrs. J. Coe (1977)

Mrs. E. (Liz) Douglas (1978-81)

Steven Milgate (1981-84)

Mrs. Romini Jayasinha (1984-88; 1990-95)

Ms. Preanthi Rajapaksha (1988-91)

Ms. Ying Shang (+ Stores, 1990s)

Mrs. Isabella Pomer (part-time, ca. 1989-2000; TO 1996)

Rhys Batchelor (1993-2008)

Oleg Zubkov (Mass Spec Tech; ca. 1990-2002)

Physical Chemistry

R.J. (Ray) Page (Instrument Tech., 1961-70)

Russell Woods (also ½time IR; 1963-65)

Ernst Kellher (Mineral Sci. Lab/Workshop; 1978-80)

Miss Christine Harper (1984-87)

Cliff Snell (1971; to Jt. Mineral Sci. Lab.)

E. (Ted) Witterick (1972-83, TO 1978)

Gordon George (1992-93)

Mrs. Jackie King (1995-201-)

Radiochemistry Laboratory

Mrs. Jean Burgess (½-time; ca. 1971-73)

Laboratory Assistants

D.L. Caldwell (1953-54)

R.M.L. Whitlock (1953-54)

D. Andrews (1955)

W. Robinson (1955)

C.M. Nissen (1956-57)

M.A. Todd (1957)

C. Nethercliffe (1959)

K. Brierely (1959-63)

P. Tong (1960)

J. Smale (1960)

I.H. Torrens (1962-64)

P. Sinke (1962)

L.H.R. Saxon (1962)

J.C. Blackett (1963-65)

P. Voelk (Biochem, 1965)

B.D. Mills (1966)

Mrs. Limgard (Biochem, 1966)

Miss A.D. Holmes (1967)

Technical Assistants (Apprentices; Trainees)[a]

Deryl Broderick (1962-63)

Miss Joyce Gin (1963)

Colin .J. Bleasdale (1966-69)

Miss Janice Hall (1966-)

C.J. Butcher (1967-68)

Miss D.J. Baxter (dates unknown)

Eric Backhouse (1976-77)

Mrs. J.M. Brooks (dates unknown)

Robert Clark (dates unknown)

Miss K. Crooks (1976-77)

Miss J. Kennedy (1976-77)

Miss K.M. Lee (dates unknown)

Miss S. Page (1976-77)

Miss L. Trigg (dates unknown)

T.G. O'Brien (1979-81)

Glassblowers

R. Barbour (1951-69; retired)

Cliff Taylor (1970-81; retired)

Ian Crichton (1967-87; left for Melbourne)

Steve Newcombe (1988-91; left for Waikato)

Grant Franklin (1992-201-)

Trainee Glassblowers

R. Gledhill (1963-65)

Ian Chrichton (1965-66)

J. Wells (*ca.* 1974-6)

Vivian Bell (1987-91)

Keri McCombe (1990-91)

Electronics Workshop

Colin A. Heath (I[st] electronics tech. 1971-77; TO 1977; then headed the VUW Electronics Facility to *ca.* 1990)

Laurie W. Morton (1978-87; TO 1983)

Tim O'Brien (*ca.* 1979-1981)

David Stead (1982-1987, TO 1988-201-)

Douglas Flux (1983-92; TO 1993-96)

Mr David Crossan (1988-1991)

Michael France (1991-2000)

Mechanical Workshop

E. Haldezos (1967-1980, TO 1981-97)

Ernst Kellher (1976-80)

Stores Managers

R. (Bob) Barbour (1952-70)

G. Peter (Lees) Leighs (1973-83)

Miss Christine Chapman (1983-87)

Miss C. Bolton (1987-88)

Raj Kumar (1988-96)

Rose Ngan (1996-98)

Stores Staff

Bert Whalen (1969-73)

D.N. (Mac) MacLean (part-time 1974-76)

H. Wallen (1978-1979)

Eddie Hollingsworth (1973-86)

A.J. Hall (1980-81)

Mrs. A.Brocklehurst (1984)

Sharon Lundy (dates unknown)

Rosiland (family name/dates unknown)

Mrs. Romini Jayasinha (1992)

Ms. Sharon Downer (1993)

Ms. Ying Shang (+ Org; 1990s)

Mrs. Jackie King (1993)

Handimen

L.H.R. Saxon (1963)

G. A. James (1964-67)

D.N. MacLean (1968-76)

Ken Curtis (1976-82)

Secretaries

Head of Department

Patricia Barr (1951-53)

Alison Malone (-1957)

Mrs. Rita Watts (1958-early 60s)

Miss Unity Jones (early 1960s-70)

Miss Judy Boaden (Mrs. J. Bethell) (1970-72)

Mrs. Carol Louisson (1972)

Miss Carol J. Mason (1973)

Mrs. P. Ward (1974)

Mrs. M.J. Wren (1976-77)

Mrs. Joan Taylor (1974-76)

Mrs. Julie Tennant (1977-78)

Miss S. Adams (1982)

Miss Janine Dougherty (1992)

Ms. Harriet Little (1994)

Miss Shona Munroe (1995-96)

Mrs. Dorothy Snowball (1997)

Inorganic Chemistry

Dawn (family name unknown; 1962-63)

Mrs. Rhyl Singleton (1964-67; 1977-2001)

Miss Judy Boaden (Mrs. J. Bethell) (1970-72)

Miss J. Lessels (1976-78)

Miss R. Hall (1980)

Miss S. Adams (1981)

Organic Chemistry

Mrs. J. Moohan (1971-76)

Mrs. V.M. Savage (1977)

Mrs. Ann Beattie (1978-90)

Ms. Teruni (family name/dates unknown)

Mrs. Janine Doherty (1991)

Mrs. Jannie Brown (1993)

Ms. Y. Cuthbert (1994)

Mrs Alison Hetherington (1996-99)

Physical Chemistry

Mrs. Celia M. Mitchell (1966-72)

Mrs. Margaret Povey (1973-79)

Miss R. Hall (1980)

Mrs. Jenny Hall (1981-2009)

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[a]It has not been possible to obtain information for the years before this. Accurate or best available dates are given where possible. [b]TO: Technical Officer; STO: Senior Technical Officer. [b]The TAs were generally employed for about 3 years to undertake Technician Certification training.

Appendix IV *Heads & Chairmen of the Department of Chemistry*

1899-1919:	Professor Thomas H. Easterfield*
1920-1959:	Professor Philip W. Robertson*
1950-1968:	Professor Stanley N. Slater*
1969-1980:	Professor James F. Duncan*
1981-1983:	Dr. Stuart I. Smedley†
1984-1986:	Professor Neil F. Curtis†
1987-1989:	Professor John W. Tomlinson†
1990-1992:	Professor Robin J. Ferrier†
1993-1996:	Dr. David C. Weatherburn†
1996-1997:	Professor John L. Spencer†
1997-2004:	Dr. James H. Johnston (Professor from 2004)‡
2004-2012:	Professor John L. Spencer‡

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*Head of Department; †Chairperson of Department and ‡Chairpersons of the School of Chemical & Physical Science from 1997 are included for completeness.

Appendix V: *Some Noted Graduates in Chemistry*

The following list of individuals is by no means exhaustive. It is arranged chronologically from 1899.

Robertson, P.W.

MSc (1906) was Victoria's first Rhodes Scholar and succeeded Easterfield as the second Professor of Chemistry.

Rigg, Sir Theodore

MSc (1911) Hon DSc (1957) succeeded Easterfield as the second Director of the Cawthron Institute.

Richardson, H.L.

MSc (1924) became an adviser in soil science to the Chinese government.

Shorland, F.B., OBE.

MSc (1932), PhD (Liverpool; 1937), DSc (Liverpool; 1970) (Hon. DSc 1970) became a world expert on lipids, the Director of the Fats Laboratory of DSIR, and a distinguished NZ Scientist; he was an Honorary Fellow at Victoria from 1970-1999.

Clare, N.T.

MSc (1935) became Chief Biochemist at the Ruakura Animal Research Station and was one-time editor of *Chemistry in New Zealand*.

White, E.P.

MSc (1938), DSc (1959) was the third recipient of the NZIC's ICI Medal and Prize.

de la Mare, P.B.D.

MSc (1942), Hon DSc (1983) was one of the foremost physical organic chemists of his era, and Professor and Head of the Chemistry Department at Auckland University.

Swedlund, B.

MSc (1944) was a physical organic chemist of high esteem and academic at the University of Auckland.

Rothbaum, H.P.

MSc (1947), BA (1951) was a distinguished DSIR scientist and Hon. FNZIC.

McDonald, I.R.C.

MSc (1949), DSc (1961) had a career in the Chemistry Division of DSIR that took him to its Directorship.

Dasent, W. E.

MSc (1950) returned to Victoria as a chemistry lecturer and subsequently its Bursar and Registrar.

Heyes, J. K.

MSc (1950) became Professor of Botany at Victoria and is now emeritus.

House, D.A.

MSc (1950), PhD (1963) became Professor of Inorganic Chemistry at Canterbury University and is now emeritus.

MacDiarmid, A.G., ONZ

MSc (1950) conducted work on plastic materials that conduct electricity, which led to him becoming a joint winner of the 2000 Nobel Prize in Chemistry.

Milburn, R.M.

MSc (1951) is an Emeritus Professor of Chemistry of Boston University.

Matheson, R.A.

MSc (1952) was a lecturer in 1959 and then became Reader in Physical Chemistry at Otago University.

Melhuish, W.H.

MSc (1952), PhD (1955) became NZ's most distinguished photochemist and a member of the IUPAC Photochemistry Commission.

Carman, R.

MSc (1956), PhD (1958) was an academic at the University of Queensland, retiring as an Associate Professor.

Ward, A.D.

MSc (1959), PhD (1962) became an academic at Adelaide University rising to the rank of Associate Professor.

Powell H.J.K.

MSc (1961), PhD (1965) is an Emeritus Professor of Chemistry at Canterbury University and a Past-President of the IUPAC Analytical Chemistry Division.

Walker, I.K.

DSc (1961) became Director of the Dominion Laboratory.

Hook (Raumati), G.E.R.

MSc (1963), PhD (1969), DSc Biochemistry (1985) became the CEO of Te Whare Wananga o Awanuiarangi, in Whakatane.

Gordon, G.J.

MSc (1965) was President of Boral Material Technologies Inc. in Texas and noted benefactor of the Curtis-Gordon Scholarships to the Chemistry Department.

Hendy, C.H.

MSc (1965), PhD (1969) is an Associate Professor in Geochemistry at Waikato University.

Clarkson, T.S. QSO

MSc (1967), PhD (1972) became the senior climatologist with NIWA.

Langdon, A.G.

PhD (1968) rose to an Associate Professor at the University of the Waikato.

Smedley, S.I.

MSc (1968), PhD Soton (1972) was the first Chairman in Chemistry at VUW and then Professor and Director of Electrochemistry at SRI International in California.

Larkindale, J.P.

MSc (1969) gained a PhD (McGill University), joined NZ's Foreign Service, rising to become senior science advisor, and retired as High Commissioner to Australia.

Woolhouse, A.D.

MSc (1969), PhD (1973) is a Senior Scientist at IRL having taken on many roles involving detailed synthesis in organic chemistry.

Speedy, R.J.

PhD (1972) became a Reader in Physical Chemist at Victoria University.

Brown, I.W.M.

PhD (1973), DSc (1999) became a Senior Materials Scientist at IRL.

Miners, J.O.

PhD (1973) became Professor of Clinical Pharmacology at Flinders University, Adelaide.

Furneaux, R.H.

PhD (1976) established the Carbohydrate Group at DSIR/IRL and is its Director.

Johnston, J.H.

PhD (1974) became a Professor of Chemistry at Victoria University forging many industry-university linkages in applied chemistry.

MacKenzie, K.J.D.

PhD (1975), DSc (1975) was a Senior Materials Scientist at IRL and is a Professor of Chemistry, Victoria University.

McKubre M.C.H.

PhD (1976) is an electrochemist at the forefront of cold fusion and Director of the Energy Research Center at SRI International, California.

Tallon, J.L.

PhD (1976) is a Distinguished IRL Scientist for his work on superconducting materials and joint recipient of the inaugural NZ Prime Minister's Science Prize.

Torrie, I.

MSc (1978) is one of the more noted senior chemistry teachers and mentors in NZ providing advice to teachers nation-wide.

Featherstone J.D.B.

PhD (1977) became Professor of of Oral Sciences at the Eastman Dental Centre in Rochester and then in Preventive and Restorative Dental Sciences at UC-San Francisco, where he is now Dean of the Faculty

MacFarlane, D.R.

BSc Hons (1978) gained his PhD degree from Purdue University becoming Professor of Physical Chemistry at Monash University and is program leader of the Energy Program in the Australian Centre for Electromaterials Science.

Banwell M.G.

PhD (1979), Hon DSc (2010) became Professor of Organic Chemistry at the Australian National University.

Keys, J.R., ONZM.

PhD (1980) became one of NZs most noted geochemists having been involved with Victoria's Antarctic research programme but it was his conservation work that led to his investiture.

Metson, J.B.

PhD (1980) is Professor of Chemistry Surface & Materials Science, University of Auckland.

Officer D.L.

PhD (1981) became a Professor of Chemistry at Massey University and is now at Wollongong University.

Prasit, P.

PhD (1981) was Merck's Head of Chemistry, discovered and developed three pharmaceuticals, then founded Amira Pharmaceuticals and Inception Science.

Williamson, B.E.

BSc Hons (1981) is Professor of Physical Chemistry at Canterbury University with interests that range over analytical, physical and spectroscopic topics.

Dent B.R.

PhD (1985) is owner and director of BD Global Ltd., a custom design synthesis company that he established in Lower Hutt following his work at DSIR.

Halton, B.

DSc (1987) joined Victoria University as a lecturer in 1968 and is now is an emeritus Professor of Chemistry having built an international reputation from the physical organic chemistry of strained aromatic compounds, editing, and writing.

Kilmartin, P.A.

BA (1989), BSc Hons (1989) is Director of Wine Chemistry, Auckland University.

Harper, R.T.

PhD (1994) is the National Operations Manager for and Director of Boral Cement Ltd.

Crowley, J.D.

MSc Hons (1999) gained his PhD from The University of Chicago in 2005 and is now a Senior Lecturer in Materials Chemistry, University of Otago.

Appendix VI: *PhD Thesis in Chemistry 1899-1999 submitted to the University of New Zealand from VUC (1954-1961) and (then alphabetically by author) to Victoria University of Wellington (1962-2001)*

1954-1959

Melhuish, William Hugh (1954):
Quenching of anthracene fluorescence: weak quenchers: presented for the degree of Doctor of Philosophy: **(WS Metcalf)**

Hassan, Ghulam (1958):
Contribution to the chemistry of picrotoxin. **(SN Slater)**

Carman, Raymond Maurice (1958):
Degradative studies in the picrotoxinin series. **(SN Slater)**

1960–69

Burns, Gary Robert (1966):
Structural studies of some sulphur bonding ligands. **(JF Duncan)**

Clark, Alan Geoffrey (1967):
Metabolism of Gammexane and related compounds. **(JN Smith)**

Furkert, Roderick John (1965):
Anion adsorption onto clay mineral surfaces using radioisotope techniques. **(AT Wilson)**

Hemmingson, Jacqueline Ann (1968):
Chloride ion catalysed rearrangement, and isotope exchange of the isomeric chlorides in acetonitrile. **(AT Wilson)**

Hendy, Christie Howard (1969):
Isotopic geochemistry of speleothems and its application to the study of past climates. **(AT Wilson)**

Hoare, Raymond Alan (1967):
Adsorption of phosphate on mica surfaces. **(AT Wilson)**

Hook, Gary Edward Raumati (1968):
Metabolism of some insecticides and related compounds in mammals and insects. **(JN Smith)**

House, Donald Arthur (1963):
Reactions of co-ordinated ligands: Schiff base complexes from polyamine complexes

and aliphatic carbonyls. **(NF Curtis)**

Johnson, Cecil Barry (1964):

Chemical reactions on surfaces. **(AT Wilson)**

Langdon, Alan George (1968):

Cation enhanced anion retention at the 001 face of Muscovite **(AG Freeman)**

MacKenzie, Kenneth John Dallas (1967):

Studies on the reactions of aluminosilicates at high temperatures. **(JF Duncan)**

McLennan, Duncan James (1965):

Role of weak bases in bimolecular elimination reactions. **(BD England)**

Millar, Keith Raymond (1963):

An investigation of some reactions of n-chlorocompounds. (**BD England)**

Mok, Kum Fun (1965):

Investigation of some iron compounds. **(JF Duncan)**

Morris, Peter John (1968):

Alkaline and metal ion catalysed hydrolysis of amino acid esters. **(RW Hay)**

Percival, Henry John (1969):

Kaolinite mullite reaction sequence. **(JF Duncan)**

Porter, Lawrence James (1967):

Kinetic and thermodynamic studies of amino acid esters. **(RW Hay)**

Powell, Harry Kipton James (1965):

Thermodynamics of copper (II) and nickel (II)-diamine complex formation in aqueous solution. **(NF Curtis)**

Rankin, Peter Charles (1967):

Study of water vapour adsorption on surface hydroxyl groups. **(AT Wilson)**

Shao, Yen-tze (1965):

Studies of phosphate in soils by simultaneous isotope exchange kinetics. **(AT Wilson)**

Spedding, David John (1964):

Anion interactions with macromolecule-carboxyl-bound cations. **(AT Wilson)**

Stewart, David John(1967):

The role of vapour phase transport and the effect of reaction conditions on the formation of spinels. **(JF Duncan)**

Tate, Kevin Russel (1968):

Kinetic and mechanistic studies of decarboxylation. **(RW Hay)**

Ward, Arthur David (1962):

The structure of quassin and neoquassin. **(BR Johns)**

Watkinson, John Herbert (1969):

Kinetics of ion exchange in soil. **(AT Wilson)**

Whimp, Peter Olaf (1967):

Some cyclic tetra amines and their metal ion complexes; a synthetic and structural study. **(NF Curtis)**

Whitfield, Harold J (1966):

Chemical investigations using the Mossbauer effect. **(JF Duncan)**

1970–79

Banwell, Martin Gerhardt (1979):

Studies of some strained ring systems: tricyclo-octanes. **(B Halton)**

Brown, Ian William Murray Brown (1973):

Aluminosilicate glass studies. **(JF Duncan)**

Browne, Alan Robert (1976):

Studies of strained small ring compounds cyclopropanaphthalenes. **(B Halton)**

Cameron, Joan M (1977):

Investigations into the binding of iron: transferrin. **(JF Duncan)**

Clarkson, Thomas Stephen (1972):

Frequency dispersion of impedance in a molten electrolyte. **(JW Tomlinson)**

Cook, Donald Ferguson (1972):

Some tetra-aza macrocyclic ligands and their metal-ion complexes. **(NF Curtis)**

Erasmuson Anton Francis (1976):

Synthesis of sporidesmin based antigens. **(RJ Ferrier)**

Featherstone, John Douglas Bernard (1977):

Chemical aspects of dental caries. **(JF Duncan)**

Fellows, Sydney Kevin (1971):

Conductance measurements on aqueous solutions over extended ranges of concentration and temperature. **(JW Tomlinson/AJ Ellis)**

Furneaux, Richard Hubert (1976):

Approaches to the synthesis of glycosides. **(RJ Ferrier)**

Halton, Margaret Patricia (1971):

Behaviour with oxygen of some biological systems: a theoretical study. **(JF Duncan)**

Johnston, James Howard (1974):

New methods in Mossbauer and X ray crystallography. **(JF Duncan)**

Martin, John William Laurence (1976):

Study of some transition metal ion complexes of novel beta iminoalcohol and triazamac-

rocyclic ligands. **(NF Curtis)**

McKubre, Michael Charles Harold (1976):

Impedance study of the membrane polarisation effect in simulated rock systems. **(JW Tomlinson)**

Melling, Peter James (1978):

Preparation and properties of anisotropic glass and glass ceramics. **(JF Duncan)**

Miners, John Oliver (1973):

Studies in the fumagillin series. **(WE Harvey)**

Morgan, Keith Raymond (1979):

Studies of nickel (II) and copper (II) complexes with some aminoalcohols, β-aminoketones and β-arminoimines. **(NF Curtis)**

Perrott, Kenneth William (1971):

Retention of phosphate: the cation exchange surface of muscovite. **(AT Wilson)**

Pound, Bruce George (1977):

Polarisation behaviour of silver in potassium hydroxide solution at elevated temperatures. **(JW Tomlinson)**

Renfrew, Richard William (1979):

Substitution reactions and equilibrium studies of some labile metal complexes. **(DC Weatherburn)**

Richards, Roger George (1975):

Aspects of the hydrolysis of titanium (IV) sulphate solutions. **(AG Freeman)**

Speedy, Robin John (1972):

Mass transport in ionic liquids. **(AM Barton)**

Tallon, Jeffrey Lewis (1976):

Premelting and the mechanisms of melting in the alkali halides. **(SI Smedley)**

Tyler, Peter Charles (1979):

Photobromination of some pyranose derivatives and reactions of the brominated products. **(RJ Ferrier)**

Wong, Herbert (1973):

Anomalous magnetic properties of certain first series transition metal complexes studies magnetochemical and spectroscopic methods. **(E Sinn)**

Woolhouse, Anthony David (1973):

Studies of some strained ring systems. **(B Halton)**

1980-89

Blattner, Regine (1982):

Synthesis of functionalised cyclchexanes from carbohydrates. **(RJ Ferrier)**

Bhula Rajumati (1989):

Synthesis and characterisation of manganese amine complexes. **(DC Weatherburn)**

Burns, Janet R (1988):

Evaluation of senior chemistry in New Zealand secondary schools. **(JF Duncan)**

Cardile, Clay Mitchell (1985):

Structural studies of selected smectites. **(JH Johnston)**

Chew, Steven (1985):

Synthetic approaches to anthracyclinones from carbohydrates. **(RJ Ferrier)**

De Raadt, Anna (1989):

New route to vinyl glycosides and an application to a novel c-glycoside synthesis. **(RJ Ferrier)**

Collier, Robert John (in Geochemistry; 1989):

Geochemical biomarker studies of oils and potential source rocks of the Taranaki basin, New Zealand. **(JH Johnston)**

Cornish, Barry Donald (1984):

Transport properties of supercooled water. **(RJ Speedy)**

Cunningham, Christopher William (1988);

Formazans: a structural and spectroscopic study of 3- substituted 1, 5-diphenyl-formazans. **(GR Burns)**

Davenport, Sally Jane (1985):

NMR studies of coal. **(GR Burns/RH Newman)**

Dent, Barry Roy (1985):

Studies of strained ring systems: cyclopropa[l]phenanthrenes. **(B Halton)**

Graham , Paul Gerard (1982):

Kinetic studies of transition metal complexes with macrocyclic ligands. **(DC Weatherburn)**

Haines Stephen R (1983):

New approaches to the synthesis of pharmacologically active compounds from carbohydrates. **(RJ Ferrier)**

Henderson, Stephen John (1985):

Water at negative pressure. **(RJ Speedy)**

Keys , John Ross Harry (in Geochemistry; 1980):

Salts and their distribution in the McMurdo region, Antarctica. **(AG Freeman/P Barrett)**

Knedler, Karin Elvira (in Geochemistry; 1985):

Geochemical and 57Fe Mossbauer investigation of East Pacific Rise and Red Sea metalliferous sediments and other selected marine sedimentary deposits. **(JH Johnston)**

Lu, Qi (Chi) (1989):

Studies of some strained organic molecules: alkylidenecycloproparenes. **(B Halton)**

Luca Vittorio (1988):

Spectroscopic investigation of cation migration in smectite clay minerals. **(AG Freeman/C Cardile)***

MacLachlan, Dugald John (1989):

Intercalation of group (IV) layered phosphates. **(AG Freeman/D Bibby)***

Metson, James Bernard (1980):

Reactivity of New Zealand ilmenites. **(JF Duncan)**

Mroczek, Edward Kazimierz (1984):

Electrochemical study of hydrothermal reactions at elevated temperatures. **(JW Tomlinson/PJ Pearce)**

Nelson, Dennis George Anthony (1981):

Dissolution behaviour of synthetic and biological apatites. **(JF Duncan)**

Officer, David Leslie (1981):

Studies of some strained organic molecules: cyclopropa[/]phenanthrenes. **(B Halton)**

Osvath, Peter (1984):

Investigation of some aspects of the coordination chemistry of synthetic macroheterocyclic ligands. **(DC Weatherburn)**

Parker, Linda Margaret (1989):

Nature of zeolite catalytic sites. **(AG Freeman/GRBurns)***

Patterson, John Ewen (1988):

The Photoacoustic effect in mercury vapour. **(GR Burns)**

Prasit, Petpiboon (1981):

Conversion of carbohydrates into functionalist carbocyclic compounds. **(RJ Ferrier)**

Randall, Clifford Joseph (1985):

Studies of some strained organic molecules: cycloproparenes. **(B Halton)**

Renders, Peter Joseph Norbert (1988):

Adsorption of hydrosulphidogold(I) complexes: amorphous arsenic and antimony sulphides at 25 and 90°C. **(TM Seward/JW Cole/RI Walcott)†**

Rollo, Joanne Rae (1988):

Spectroscopic study of some phosphorus chalcogenide. **(GR Burns)**

Satherley, John (1983):

Electrical conductivity of some hydrous and anhydrous molten silicates as a function of

temperature and pressure. **(SI Smedley)**

Severn, Wayne B (1987):

Studies in the liquefaction of biomass. **(RJ Ferrier)**

Siriwardena, Asokamali (1988):

Compounds of 6, 13-diamino-6, 13-dimethyl-1, 4, 8, 11-tetraazacyclotetra-decane. **(NF Curtis)**

Tapp, Neville John (1988):

Synthesis and characterisation of aluminophosphate molecular sieves. **(AG Freeman/N Milestone/NF Curtis)***

1990–99

Aitchison, Phillip (1998):

Lithium insertion and proton exchange in layered and spinel oxides of cobalt and manganese. **(GR Burns)**

Ammundsen Brett (1996):

Spinel lithium manganates: characterisation: probe spectroscopic and structural methods, and a synthetic route to a nanocrystalline form. **(GR Burns)**

Bowles, Richard Kerr (1997):

Thermal and statistical entropy of glasses. **(RJ Speedy)**

Collier, Susan Jane (1993):

Spinel type manganese oxides selectivity and reaction mechanism for extraction of lithium from Wairakei geothermal water. **(GR Burns)**

Dougherty, Brian James (1990):

Dissolution mechanism of aluminium in methanol and in methanol/water solutions. **(SI Smedley/JW Tomlinson)**

Fake, Antony Douglas (1999):

Sesquiterpenoids from the New Zealand marine sponge Dysidea sp. **(PT Northcote)**

Harper, Ross Thomas (1994):

Extraction of amorphous silica from geothermal water and its application to improve newsprint quality. **(JH Johnston)**

Holden,Steven Gary (2001): §

Towards a total synthesis of C_{60}. **(RJ Ferrier)**

Jones, Carissa Susan (2001): §

Studies of some strained organic molecules. **(B Halton)**

Kay, Andrew J (1996):

Studies of some strained organic molecules. **(B Halton)**

Lee, Neil Paul (1997):

Production of titanium dioxide pigment from waste NZ Steel making slag. **(JH Johnston)**

Mettananda, Lokusatu Hewa Indumathie Uditha (1990):

Electrical conductivity measurements of some supercooled aqueous electrolyte solutions. **(RJ Speedy)**

Meyer, Stephen John (1996):

Development and optimisation of the process chemistry to extract an amorphous silica product from geothermal water to enhance paper quality. **(JH Johnston)**

Nils Erik (in Geochemistry; 1997):

Petroleum geology and geochemistry of oils and possible source rocks of the Southern East Coast Basin, New Zealand. **(JH Johnston)**

Petersen, Paul Martin (1990):

Applications of free radical reactions in synthetic carbohydrate chemistry. **(RJ Ferrier)**

Puschmann, Horst (1999):

Trinuclear carboxylate complexes of first row transition metals. **(DC Weatherburn)**

Rogers Karyne Maree (in Geochemistry; 1995):

Oil seeps and potential source rocks of the Northern East Coast Basin, New Zealand: a geochemical study. **(JH Johnston)**

Russell, Sarah Grace Gray (1990):

Studies of some strained ring systems. **(B Halton)**

Sarfati, Jonathan David (1994):

Spectroscopic study of some chalcogenide ring and cage molecules. **(GR Burns)**

Shen, Chaohong (2000): §

Electrophilic metal complexes. **(JL Spencer)**

Sim, Murray Neville (1993):

Investigation of illite/smectite interstratification by X-ray diffraction and transmission electron microscopy sedimented aggregate structure and smectite to illite conversion in Taranaki Basin sediments. **(JH Johnston)**

West, Lyndon Michael (2001): §

Isolation of secondary metabolites from New Zealand marine sponges. **(PT Northcote)**

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*Dr. Alan Freeman died in 1985 and the supervision of his students was taken on by others.

†Although classified as a chemistry thesis, this study was carried out at Chemistry Division, DSIR under the supervision of Dr Terry Seward with Profs Jim Cole and Dick Walcott as Victoria University supervisors. No one in the Chemistry Department was involved.

§Although submitted after 1999, these theses stem from work performed largely within the Easterfield Building within the first century of chemistry at Victoria.

Appendix VII: *DSc Degrees Awarded in Chemistry*

*Honorary DSc Degrees awarded to chemists by the University of NZ and Victoria**

Conant, James Bryant, President of Harvard University, 1951.

Davies, William, Professor of Chemistry, University of Melbourne, 1956.

Rigg, Sir Theodore, Chairman Cawthron Institute 1933-1956, 1957

de la Mare, Peter Bernard, Emeritus Professor of Chemistry, University of Auckland, 1983.

MacDiarmid, Alan Graham, Blanchard Professor of Chemistry, University of Pennsylvania, 1999.

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*The honorary degrees awarded by the University of New Zealand (to 1961) show no source of nomination. Those from Victoria University stemmed from nominations made by the Chemistry and Physics Departments.

DSc Degrees in chemistry awarded from thesis submission

(alphabetical)

Andrews, David Ernest, Papers on trace elements in relation to animal health in New Zealand, 1967.

Brown, Ian William Murray, Selected papers in glass, mineral and ceramic science, 1999.

Carman, Raymond Maurice, Natural product chemistry and organic stereochemistry, 1970.

Chamberlain, Edward Edinborough, University of New Zealand, 1939.

Halton, Brian, Studies of some strained organic molecules, 1987.

Hansen, Roy Penrose, Papers on the chemistry of fats, oils, acids and lipids, 1974.

Hartman, Leopold, Papers on the chemical analysis of fats, 1961.

MacKenzie, Kenneth John Dallas, Contributions to solid state mineral chemistry, 1975.

McMahon, William Anthony John, Geothermal studies and geochemistry, 1981.

McNaught, Kenneth John, Papers on soil chemistry, with regard to cobalt content and fertilization, 1969.

Milestone, Neil Brennan, Contributions to the chemistry of silicates, 1999.

Rafter, T. Athol, Papers in Nuclear physics with low temperature research in chemistry, 1967.

Tallon, Jefferey Lewis, Selected publications, 1996.

Walker, Ian Kenneth, Spontaneous ignition,1961.

White, Edwin Percy, Sixteen papers, 1959.

Will, Graham Melville, Papers on the chemical analysis of soils in Pinus radiata forests of New Zealand, 1969.

Appendix VIII: *Chemical Bonding*

Over and above the teaching and research performed in the Chemistry Department at Victoria, the chemical connections that started there have extended well beyond the confines of the laboratory and the lecture room to natural chemical bonding. The names of the few known to have entered into partnerships from meeting in the hallowed halls of the Chemistry Department deserve a place in this record. Even though only a few of these are known, they are provided below. The list includes both staff and students known to have forged lifelong relationships through chemical bonding in the institution. The incomplete list that follows is a record that can be expanded as new partnerships emerge and as older ones come to light.

Alan A. Turner (BSc 1959) and Iivi Alet (MSc 1959)

Dr. Neil F. Curtis (staff) and Yvonne M. Howard (MSc 1962)

Gary R. Burns (MSc 1961; PhD 1966; staff) and Janet R. Davies (MSc 1962)

John P.M. Bailey (MSc 1966) and Margaret L. Dickson (BSc 1966)

Brian R. Coles (MSc 1968) and Christine Coles (neé Marsh) (MSc 1970)

Dr. Brian Halton (DSc 1987; staff) and Margaret P. Leach (MSc 1969, PhD 1971)

Graeme L. Dick [MSc 1968; PhD (Biochemistry) 1974] and Margaret M. Russell (BSc 1969)

Brian L. Balshaw (BSc Hons. 1974) and Karen M. Kenna (BSc, Hons. 1974)

Geoff Bethell (PhD Lond. 1972) and Judy Boaden (HoD Secretary, 1970-72)

Ian Torrie (MSc 1978) and Jill Alderton (BSc 1977)

Chris Dangerfield (BBMedSci. Hons. 2007) and Emma Dangerfield (PhD 2012) (neé Smith, BBSc Hons. 2007)

Dr. Richard Tilley (staff) and Soshan Cheong (PhD, 2011)

Appendix IX: *Timeline: Buildings Occupied by Chemistry at Victoria*

1899-1905: An upstairs room at the Technical School, Victoria Street, Wellington City.

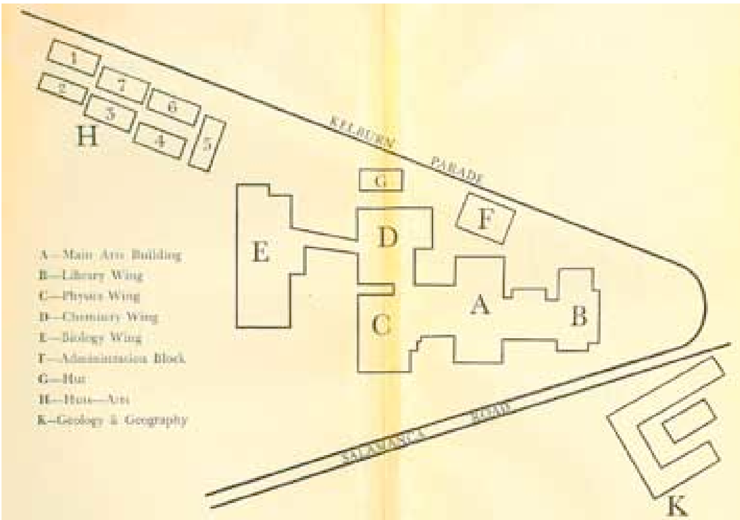
1906-1940: The southern part of the original Hunter Building, Kelburn.

1940-1958: The 'west wing' on the Kelburn Parade side of the Hunter Building following the move of biology into the Kirk Building in 1940. Although the exact date is unknown, it is thought to be in late 1940 or 1941. There is no doubt that Chemistry was housed there by the end of 1942 from evidence given by Dr. Joan (Mattingley) Cameron, a beginning student in 1943. The wing became known as the Chemistry Building (wing) after it was occupied by the Department. It is also designated in the College calendar in its frontispiece as shown below for 1948 on a sketch of buildings (see frontispiece). The west wing opened in 1910 and was demolished only after the move of Physics (from Hunter and this building) into the Laby Building in 1983. Most likely the demolition was in the 1984-85 summer vacation.

1958-1999: The Easterfield Building, except for Mr. Bill Martin, the Research Fellow working with Monro on ironsands. He remained in the old Chemistry Building until he left in 1960.

2000-: The Laby Building and its millennium extension, and the subsequent (2008) modifications to the Level 0/1 mezzanine floor that provided additional laboratory space.

2010-: The Laby Building, its extension and modifications, and the MacDiarmid Building Levels 1 and 2.



Frontispiece: 1948 VUC Calendar; D is the Chemistry Wing or Building (courtesy of the Beaglehole Room, VUW)

Appendix X: *Student Numbers at Victoria - 1899-1995*

YEAR	NUMBER	YEAR	NUMBER
1899[a]	115	1950	2165
1904	195	1955	2291
1909	466	1960	3294
1914	377	1965	4535
1919	534	1970	5808
1924	807	1975[b]	6253
1929	815	1980	7158
1934	786	1985	7813
1940	1088	1990	9562
1945	1445	1995	11,728

[a]Data for 1899-1970 taken from the Victoria University College calendars, 1973 being the last year to carry the entry. [b]Data for 1975-1995 taken from *Victoria University 1899-1999: A History* by Rachel Barrowman, Appendix Two, p.382.

Appendix XI: *Publications of the Staff of Victoria College & Victoria University College 1899-1959*

(listed alphabetical by name)

The Papers of M. H. Briggs - Victoria University College (to 1961) & Victoria University

1. Briggs, M. H. *Vitamin and coenzyme content of hepatomas induced by butter yellow*. *Nature* **1960**, *187*, 249-50.
2. Briggs, M. H. *A comparison of some enzymes catalyzing biotin-dependent reactions*. *NZ J. Sci.* **1960**, *3*, 3-7.
3. Briggs, M. H. *Biological activity of isomers of biotin homologs and their sulfones*. *NZ J. Sci.* **1960**, *3*, 72-3.
4. Briggs, M. H. *The effects of injected biotin and dethiobiotin on butter yellow carcinogenesis in rats fed a protective diet*. *Aust. J. Biol. Sci.* **1960**, *13*, 196-8.
5. Briggs, M. H.; Revill, J. P. Mars. I. *The atmosphere*. *J. Brit. Interplanet Soc.* **1960**, *17*, 391-3.
6. Briggs, M. H. *Amino acids and peptides from some NZ fossils*. *NZ J. Geol. Geophys.* **1961**, *4*, 387-91.
7. Briggs, M. H. *The visual pigment of an isopod crustacean*. *Aust. J. Biol. Sci.***1961**, *14*, 487-8.
8. Briggs, M. H.; Duncan, R. B. *Odor receptors*. *Nature* **1961**, *191*, 1310-1.
9. Kitto, G. B.; Briggs, M. H. *The biosynthetic pathway of nicotinamide adenine dinucleotide in an insect. Hemideima thoracica*. *NZ J. Sci.* **1962**, *5*, 237-40.
10. Kitto, G. B.; Briggs, M. H. *Lactate dehydrogenase in some insect muscles*. *Nature* **1962**, *193*, 1008.
11. Kitto, G. B.; McNicoll, J.; Briggs, M. H. *Vitamin B12-coenzyme*. *Sci. Culture* **1962**, *28*, 295-302.
12. Kitto, G. B.; Briggs, M. H. *Nicotinamide content of insects*. *Aust. J. Biol. Sci.* **1965**, *18*, 1245-7.

The Papers of W. E. Dasent - Victoria University College (to 1961) & Victoria University

1. Dasent, W. E.; Waddington, T. C. *A new type of organic derivatives of tervalent iodine, micro-oxodi-nitratodiphenyldiiodine. Proc. Chem. Soc*, **1960**, 71.
2. Dasent, W. E.; T. C. Waddington, *Iodine-oxygen compounds. I. Infrared spectra and structure of iodates. J. Chem. Soc*. **1960**, 2429-32.
4. Dasent, W. E.; Waddington, T. C. *Iodine-oxygen compounds. II. Iodosyl and related compounds. J. Chem. Soc*. **1960**, 3350-6.
5. Fraser, R. T. M.; Dasent, W. E. *The composition of the nitric oxide complexes of cupric*

halides. J. Am. Chem. Soc. **1960**, *82*, 348-51.

6. Dasent, W. E. *Nonexistent compounds. J. Chem. Educ*. **1963**, *40*,130-4.
7. Dasent, W. E.; Waddington, T. C. *The infrared spectrum and structure of I_2O_4*. J. *Inorg. Nucl. Chem*. **1963**, **25**, 132-3.
8. Dasent, W. E.; Morrison, D. *The sulfites of copper (I).* J. *Inorg. Nucl. Chem*. **1964**, *26*(6), 1122-5.
9. Dasent, W. E.; Sharman, L. E. *Nitrato derivatives of substituted iodosobenzenes. J. Chem. Soc*. **1964**, 3492-3.
10. Dasent, W. E. *Nonexistent Compounds: Compounds of Low Stability*. Marcel Dekker, Inc.: New York, NY, 1965, pp. 192
11. Dasent, W. E. *Inorganic Energetics.* Penguin Library of Physical Sciences, 1970, pp. 165
12. Dasent, W. E. *Inorganic Energetics: An Introduction.* Cambridge University Press: Cambridge, 1982, 2nd edn. pp. 185.

The Papers of T. H. Easterfield: Victoria College (to 1914) & Victoria University College

1. Easterfield, T. H.; Aston, B. C. *Tutu, Part I. Proc. Chem. Soc*. **1900**, *16*, 211-2.
2. Easterfield, T. H. *Remarks on the Chemistry of Tutu. Trans. Proc. NZ Inst.* **1900**, *33*, 345.
3. Easterfield, T. H.; Aston, B. C. *Tutu. Part 1. Tutin and coriamyrtin. J. Chem. Soc.* **1901**, *79*, 120-6.
4. Easterfield, T. H.; Aston, B. C. *Studies on the Chemistry of the New Zealand Flora*. *Trans. Proc. NZ Inst.* **1901**, *34*, 495.
5. Easterfield, T. H.; Bee, H. *Raoult's Method for Molecular Weight Determination*. *Trans. Proc. NZ Inst.* **1901**, *34*, 497.
6. Robertson P. W.; Easterfield, T. H. *The Vapour Densities of the Fatty Acids Robertson*, *Trans. Proc. NZ Inst.* **1901**, *34*, 499.
7. Easterfield, T. H.; Bagley, G. *A Contribution to the Chemistry of Colophony*. *Trans. Proc. NZ Inst.* **1902**, *35*, 476.
8. Easterfield, T. H.; Aston, B. C. *Rimu resin. Proc. Chem. Soc*. **1903**, *19*, 190-1.
9. Easterfield, T. H.; Aston, B. C. *Note over the Karaka fruit. Proc. Chem. Soc*. **1903**, *19,* 191.
10. Easterfield, T. H.; Aston, B. C. *Studies on the Chemistry of the New Zealand Flora*. *Trans. Proc. NZ Inst.* **1903**, *36*, 483.
11. Easterfield, T. H.; Bagley, G. *Resin acid of the Conifers. Part I. The constitution of the abietic acid Proc. Chem. Soc*. 1904, **20**: p. 112-3.
12. Easterfield, T. H.; Bagley, G. *The resin acids of the Coniferae. Part I. The constitution of abietic acid. J. Chem. Soc*. *Trans*. **1904**, *85*, 1238-49.
13. Easterfield, T. H.; Taylor, C. M. *Studies on the Chemistry of the NZ Flora*. *Trans. Proc. NZ Inst.* **1910**, *43*, 53.
14. Easterfield, T. H. *Ketones*. GB Patent Appl. 1911.

15. Easterfield, T. H.; Taylor, C. M. *Ketones*. Ger Patent Appl. 1911.
16. Easterfield, T. H. *The Interaction of Iron with the Higher Fatty Acids*. *Trans. Proc. NZ Inst.* **1911**, *44*, 301.
17. Easterfield, T. H.; Taylor, C. M. *Preparation of the Ketones of the Higher Patty Acids. J. Chem. Soc. Trans*. **1911**, *99,* 2298-307.
18. Easterfield, T. H.; Taylor, C. M. *Preparation of the Ketones of the Higher Patty Acids. Proc. Chem. Soc*. **1912**, *27*, 279.
19. Easterfield, T. H. *Making ammonium sulfate*. US Patent Appl. 1913.
20. Easterfield, T. H. *Preparing a concentrated solution of ammonium sulfate*. GB Patent Appl. 1915.
21. Easterfield, T. H.; McDowell, J. C. *Studies on the Chemistry of the New Zealand Flora*. *Trans. Proc. NZ Inst.* **1915**, *48*, 518.

The Papers of B. D. England, including the sole 1966 paper of R. G. Burns: Victoria University College (to 1961) & Victoria University

1. Carr, M. D.; England, B. D. *A new mechanism of electrophilic aromatic chlorination. Proc. Chem. Soc. London*, **1958**, 350-1.
2. Burns, R. G.; England, B. D. *Interpretation of kinetics of bimolecular substitution by anionic bases in alcohol-water mixtures. Tetrahedron Lett.* **1960**(24), 1-6.
3. Alet, I. R.; England, B. D. *A comparison of the nucleophilic reactivity of ethoxide, methoxide, and hydroxide ions in dioxane. J. Chem. Soc*. **1961**, 5259-62.
4. England, B. D.; House, D. A. *The dissociation constant of phenol in alcoholic solvents. J. Chem. Soc*. **1962**, 4421-3.
5. England, B. D. Owen, M. L.; Barbour, R. *Design of liquid bath thermostats. Lab. Pract*. **1962**, *11*, 601-4.
6. Burns, R. G.; England, B. D. *The influence of solvent composition on the rates of second-order nucleophilic substitution reactions in alcohol-water mixtures. J. Chem. Soc. B*, **1966**, 864-7.
7. England, B. D.; McLennan, D. J. *Eliminations promoted by thiolate ions. I. Kinetics and mechanism of the reaction of DDT with sodium benzenethiolate and other nucleophiles. J. Chem. Soc. B*, **1966**, 696-705.
8. Buckley, P. D. England, B. D. McLennan, D. J. *Influence of solvent composition on the rates of E2 elimination and similar reactions in alcohol-water mixtures. J. Chem. Soc. B*, **1967**, 98-101.
9. Anderson, R. J.; Ang, P.; England, B. D.; McCann, V. H.; McLennan, D. J. *Solvent effects on the rates of miscellaneous nucleophile-promoted reaction in aqueous-alcoholic solvent mixtures. Aust. J. Chem*. **1969**, *22*, 1427-37.
10. Hemmingson, J. A.; England, B. D. *S_N2' mechanism. Chloride ion-catalyzed isomerization of alpha- and gamma-methylallyl chloride. J. Chem. Soc. B*, **1971**, 1347-52.

The Papers of W. E. Harvey - Victoria University College (to 1961) & Victoria University

1. Harvey, W. E. *Derivatives of isopentylbenzene. J. Chem. Soc*. **1958**, 2060-2.
2. Andrews, E. D.; Harvey, W. E. *Compounds derived from* o-*(2-carboxyethyl)benzoic acid. J. Chem. Soc*. **1961**, 4687-9.
3. Adhikari, S. K. Bell R. A.; Harvey, W. E. *Cyclitols from the heartwood of Phyllocladus trichomanoides. J. Chem. Soc*. **1962**, 2629-31.
4. Harvey, H. E.; Harvey, W. E. *Gas chromatographic determination of dieldrin residues on pasture. NZ J. Sci*. **1963**, *6*(1), 3-5.
5. Bell, R. A.; Harvey, W. E. *Wax from the heartwood of Phyllocladus trichomanoides.* NZ J. Sci. **1963**, *6*(1), 64-5.
6. Andrews, E. D.; Harvey, W. E. *7,7-Dimethylnorcarane and 3-methoxy-7,7-dimethylnorcarane. J. Chem. Soc*. **1964**, 4636-7.
7. Harvey, W. E.; Miners, J.O. *The synthesis of diepoxide analogs of fumagillin. Aust. J. Chem*. **1979**, *32*, 2473-81.

The Papers of R. Basil Johns - Victoria University College

1. Benstead, J. C.; Gee, R.; Johns, R. B.; Martin-Smith, M.; Slater, S. N. *Picrotoxin and tutin. VI. Methylation and methanolysis*. *J. Chem. Soc*.**1952**, 2292-9.
2. Johns, R. B.; Slater, S. N.; Woods, R. J.; Brasch, D.; Gee, R.; Hassam, G.; Sleeman, G. R. *Picrotoxin and tutin. VIII. J. Chem. Soc*. **1956**, 4715-27.
3. Carman, R. M.; Hassan, G.; Johns, R. B. *Picrotoxin and tutin. IX*. *J. Chem. Soc*. **1959**, 130-7.
4. Carman, X. R. M.; Coombe, R. G.; Johns, R. B.; Ward, A. D. *Picrotoxin and tutin*. *J. Chem. Soc*. **1960**, 1965-72.
5. Browne, G. F.; Johns, R. B.; Markham, K. R. *Picrotoxin and tutin. XI. J. Chem. Soc*. **1961**, 3000-5.
6. Johns, R. B.; Markham, K. R. *Picrotoxin and tutin. XII. The structure of tutin*. *J. Chem. Soc*.**1961**, 3006-10.

The Papers of R. A. Matheson - Victoria University

1. Matheson, R. A. *A spectrophotometric study of the association of Cu^{2+} and SO_4^{2-} ions in aqueous solutions of constant ionic strength*. *J. Phys. Chem.* **1965**, *69*, 1537-45.
2. Matheson, R. A. *Dissociation of tetra*-n-*hexylammonium iodide in dichloromethane*. *J. Phys. Chem.* **1966**, *70*, 3368-9.
3. Matheson, R. A. *Association of thiosulfate ions with bis(ethylenediamine) copper(II) ions in aqueous solution*. *J. Phys. Chem.* **1967**, *71*, 1302-8.
4. Matheson, R. A. *Spectrophotometric determination of association constants for $CuSO_4$ and $Cu(en)2S_2O_3$*. *J. Phys. Chem.* **1969**, *73*, 4425-6.
5. Matheson, R. A. *Thermodynamics of electrolyte equilibrium in media of variable water*

concentration. *J. Phys. Chem.* **1969**, *73*, 3635-42.

6. Turner, I. R.; Matheson, R. A. *The trace diffusion of iodide in aqueous solutions of Ca and Cd perchlorates*. *Aust. J. Chem.* **1966**, *19*, 351-5.

The Papers of W. S. Metcalf - Victoria University College

1. Metcalf, W. S. Perloline. III. *NZ J. Sci.Technol. A: Ag. Res.* **1947**, *29B*, 98-9.
2. Bowen, E. J.; Metcalf, W. S. *The quenching of anthracene fluorescence*. *Proc. Royal Soc. Series A* **1951**, *206*, 437-47.
3. Melhuish, H. W.; Metcalf, W. S. *Quenching of the fluorescence of anthracene. Transition from strong to weak quenching*. *J. Chem. Soc.* **1954**, 976-9.
4. Metcalf, W. S. *Quenching of the fluorescence of anthracene gas*. *J. Chem. Soc.* **1954**, 2485-6.
5. Metcalf, W. S. *Studies on perloline. IV*. *NZ J. Sci. Technol. A* **1954**, *35B*, 473-7.
6. Melhuish, W. H.; Metcalf, W. S. *Quenching of the fluorescence of anthracene*. *J. Chem. Soc.* **1958**, 480-2.

The Papers of A. D. Monro - Victoria University College

1. Monro, A. D. *The isotope ratio of New Zealand boron. J. Chem. Soc. Trans*. **1922**, *121*, 986-8.
2. Monro, A. D. *Occlusion of gases in coal. J. Soc. Chem. Ind. London* **1922**, *41*, 129-32.
3. Davies, C.; Monro, A. D. *Solubility of cupric sulfide in alkali sulfide in the presence of thioarsenates. J. Chem. Soc*. **1927**, 2385-6.
4. McIlroy, R. J. A.; Espiner, C. ; Monro, A. D. *Thiocyanate co.ovrddot.ordination compounds. J. NZ Inst. Chem.* **1936**, *1*, 10-4.
5. Monro, A. D.; Gibbs, H. S. *Vanadium and titanium in Taranaki ironsand. NZ J. Sci. Tech*. **1938**, *19*, 523-6.
6. Monro, A. D.; Beavis, G. *The constitution of Taranaki ironsand. NZ J. Sci. Tech. Sect. B* **1945**, *27B*, 237-41.

The Papers of P. W. Robertson - Victoria College (to 1905) & Victoria University College (1920-1957)

1. Robertson, P. W.; Easterfield, T. H. *The Vapour Densities of the Fatty Acids*. *Trans. Proc. NZ Inst.* **1901**, 34, 499.
2. Robertson, P. W. *The Latent Heats of Fusion of the Elements and Compounds*. *Trans. Proc. NZ Inst.* **1901**, *34*, 501.
3. Robertson, P. W. *The Molecular Complexity of the Fatty Acids and their Derivatives in Phenol Solution. Trans. Proc. NZ Inst.* **1902**, *35*, 452.
4. Robertson, P. W. *The Exhibition of a Maximum or Minimum in the Properties of certain Series of Organic Compounds*. *Trans. Proc. NZ Inst.* **1902**, *35*, 465.
5. Robertson, P. W. *The Distillation of the Fatty Acids for the Manufacture of Candles*.

1904, *37*, 568.

6. Robertson, P. W. *The Association of the Fatty Acids and their and the Arrangement of Atoms in Space*. *Trans. Proc. NZ Inst.* **1904**, *37*, 577.
7. Robertson, P. W. *New Compounds of a Similar Nature to Antifebrine*. *Trans. Proc. NZ Inst.* **1905**, *38*, 45.
8. Robertson, P. W. *The Detection and Estimation of the Alkaloids by means of their Double Sulphocyanides*. *Trans. Proc. NZ Inst.* **1905**, *38*, 51.
9. Robertson, P. W. *The estimation of organic chlorine or bromine by the chromic acid method. Chem. News J. Ind. Sci*. **1920**, *120*, 54.
10. Worsley, R. R. L.; Robertson, P. W. *Peroxides of bismuth. J. Chem. Soc*. *Trans*. **1920**, *117*, 63-7.
11. Robertson, P. W.; Burleigh, D. H. *Quantitative Analysis in Theory and Practice*. Edward Arnold: London 1920, pp. 63.
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In the First-year lab, Easterfield Building
SCPS Photograph

About the Author

Brian Halton was born in Lancashire, England and attended St. Joseph's College in Blackpool as a boarder and then senior school at St. Joseph's Academy in Blackheath (London) where he was able to attend Royal Society Schools' marvellous Christmas lectures given by the late Sir Lawrence Bragg. His undergraduate and graduate education was completed at Southampton University (1960-1966) and followed by postdoctoral experience and then Assistant Professorship at the University of Florida in Gainesville. He was appointed to a lectureship at Victoria University of Wellington in 1968 and arrived in New Zealand in late September that year; he has remained in Wellington ever since.

He has served on several international committees and boards and remains a referee for many prominent international chemistry journals. He is currently the only Honorary Fellow of the New Zealand Institute of Chemistry elected in the 21st century and is the past-editor of its flagship journal Chemistry in New Zealand.

As an emeritus professor of chemistry, he has provided an autobiography that surveyed his fifty years as a practising organic chemist. In contrast, the present work offers Chemistry at the Victoria University of Wellington from the viewpoint of the chemist and not a historian. While not everything will be historically accurate, the book collates much information not easily available elsewhere.

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